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CONJOINT SESSION

OF

NORTH CAROLINA BOARD OF HEALTH

AND

MEDICAL SOCIETY OF NORTH CAROLINA,

HELD IN

Concord, May 10th, 1882.

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CONJOINT SESSION.

Preventive Medicine:

An Essay

Read before the Conjoint Session of the North Carolina Board of Health and the Medical Society of North Carolina, at Concord, May, 1882.

By W. P. BEALL, M. D.,
GREENSBOROUGH.

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PREVENTIVE MEDICINE.

An Essay read before the Conjoint Session of the North Carolina Board of Health and the Medical Society of North Carolina, at Concord, N. C., May, 1882,

BY

W. P. BEALL, M. D., GREENSBOROUGH, N. C.

The appointment of myself as essayist for this occasion was a very unexpected honor; and while I value very highly the compliment thus paid me, it has imposed upon me a duty for which I find myself very illy prepared.

Upon no subject pertaining to medicine could I hope to present, from my own limited experience, anything which would not be as trite and familiar as "twice told tales" to the members of this Society; and there was nothing in the literature of medicine within my reach, which was not equally accessible to you.

Recognizing and appreciating my difficulties in securing a suitable topic, you will, I feel sure, pardon any failure on my part in presenting anything new for your consideration.

Having been greatly impressed during the past winter by the general indifference to the subject of Preventive Medicine, and the almost universal neglect of its plainest principles, I have endeavored to collect here some facts showing the importance and progress of this science, and to call attention to some of the difficulties with which it has to contend.

By the term Preventive Medicine, as used in this paper, is meant any and all means, which, intelligently used, tend to promote existing health, and to reduce to a minimum

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the ravages of any disease. This, of course, embraces much, that is, strictly speaking, outside of the province of the physician; as sanitary engineering, removal and disposal of filth, the proper location and construction of dwellings, etc., but in this country the physician is practically the custodian of the public health, and should be qualified to give intelligent advice on all these points.

The importance of my subject is self-evident. If the science of medicine, when applied to the healing of disease, is one of the noblest to which man can devote his time and talents, how much nobler is it when it strives to invade the strongholds of disease, and, by restricting and limiting the avenues through which it makes its attacks, adds immensely to the wealth, prosperity, and happiness of mankind. Preventive Medicine is indeed "the highest department of the art of the physician."

The great need for a comprehensive and practical system of Preventive Medicine is as obvious as is the importance of the subject, for nothing is more thoroughly recognized than the fact that a very large proportion of the annual mortality of this country is due to causes clearly preventable.

The usual estimate among sanitarians is, that by the adoption, by individuals and communities, of proper modes of life, nearly half of the disease now existing might be abolished, and the annual mortality reduced to not more than 15 per 1,000.

Taking, for comparison, the report of the National Board of Health, I find the mortality for 1881, in one hundred and sixty-one towns and cities of the United States, representing a population of over 8,500,000, to be 24.7 per 1,000, or nearly 10 deaths per 1,000 in excess of the above estimate.

That this estimate of the reduction possible is not extravagant, is proven by what Preventive Medicine has already been able to accomplish.

In England where this science is further advanced than elsewhere, and where an elaborate system of vital statistics

is in force, it has been shown that by intelligent sanitary work in certain groups of towns, where the previously existing rate of mortality was accurately known, a reduction in death rate of from 4 to 7 per 1,000 was effected.

The mortality of New York City in 1867 was ascertained by her Board of Health to be about 36 per 1,000, and the deaths among children under five years of age constituted 53 per cent. of total mortality. In 1881, with a population larger by 33 per cent., and with no special change in its character, habits or surroundings, except improvement in drainage and sewerage and better ventilation of dwellings, and some enforced cleanliness, the mortality was 31.9 per 1,000, and the deaths among children under five were 45 per cent. of total mortality. Here is a reduction in general death rate of over 10 per cent., and New York is still one of the unhealthiest cities in the United States.

Such a reduction as this in the mortality existing among our 50,000,000 of population, would amount to more than 300,000 lives annually, to say nothing of the immense amount of suffering and sorrow and loss thereby obviated.

We already know that many of the diseases now in existence can be destroyed, or greatly lessened in severity by the use of proper means, and as our knowledge of etiology increases, it is highly probable that the list of preventable diseases will be considerably extended.

Important as is this subject, it is grossly neglected. The report of the yellow fever commission shows this to be an imported disease, and should be easily preventable by the rigid enforcement of quarantine; yet in 1878, the whole country mourned over its fearful ravages in the Mississippi Valley.

No fact in medicine is more clearly established than that small pox is easily preventable, and at very slight expense; yet it was last year declared epidemic in the United States by the National Board of Health, and over 4,000 deaths from this disease were reported. In the City of Richmond

during the five months ending March 1st, 1882, the deaths from small pox were 19.5 per cent. of the total mortality for the same time.

The experience of every physician, who had anything to do with vaccination during the past winter, could not fail to impress upon him the alarming lack of protection against small pox existing in this State.

During the month of January I vaccinated about 200 persons, white, 96 of whom had been vaccinated previously as shown by scars, and of these revaccinations 48, or exactly 50 per cent., were successful, showing that about 75 per cent. of number vaccinated were unprotected. The condition of our negro population is even worse. Of more than 400 vaccinations made by our county physician among them, four-fifths were primary, and the average age of these primary cases was 12½ years.

All the means within our reach for advancing this work should be vigorously used. While educating ourselves let us strive to instruct the laity in the fundamental principles of this science, that we may the sooner obtain their active co-operation. Every physician is an authority among his own patients, and sound sanitary advice, given and reiterated, will at length be accepted and acted upon. Our people are not slow to avail themselves of a recognized good, and as they are made aware of the benefits of Preventive Medicine, and appreciate the advantages to be obtained, they will be willing to devote a portion of the wealth, saved to them by this science, to aid in investigating still further the causes of disease, and will cheerfully defray the expense of removing, as much as possible, these hurtful causes.

The formation of local sanitary associations would be a long step in the right direction, for as soon as the benefits of such organizations became manifest, it would be comparatively easy to extend their scope so as to embrace counties and State, and gradually to pave the way toward the adoption of a National system of Preventive Medicine; for

such a system can work only through State and local organizations.

The statistics of Great Britain show that all sanitary improvements exhibit their good effects most plainly in reducing the mortality of typhoid fever, phthisis and the intestinal diseases; this reduction being in some instances as high as 60 per cent., showing plainly that all these are in a great measure preventable. Indeed, it is generally conceded that a large proportion of the mortality of diarrhœal diseases is due to removable causes; and yet over 10 per cent. of the total mortality reported by the National Board of Health for last year is placed under this head.

In regard to phthisis, the investigations of Bowditch, in Massachusetts, and of Buchanan and Simon in England, seem to prove conclusively that a large proportion of the cases of this disease is due to soil dampness. Mr. Simon says of this investigation, "It confirms, without any possibility of question, the conclusion previously suggested, that dampness of soil is a very important cause of phthisis to the population living upon such soil."

These facts surely give us a large field in which to labor, and it is steadily increasing in size. Trained experimenters are actively engaged in studying the causes of disease in the field of experimental comparative pathology, and this is a work only valuable when done by those whose special training gives authority to their discoveries and deductions.

All of you no doubt are familiar with Pasteur's investigations of splenic fever, which have already resulted in great pecuniary advantage to France, and may in the future lead to results in the interests of Preventive Medicine at present scarcely dreamed of.

In this country also, we have scientific investigators busily pursuing various lines of inquiry, some of them under the direction of the National Board, and we are given the benefit of their discoveries, and the application of them rests with the active practitioner.

Interest in the subject is on the increase, and it is becoming more and more evident that Preventive Medicine is destined in the near future to take an important position in the economy of society. Fifteen years ago there was not, I believe, a single State Board of Health in existence. To-day such organizations exist in twenty-seven States. We have a National Board of Health and an American Public Health Association, both active and working organizations composed of the foremost sanitarians of this country.

All this looks very encouraging, but we must remember that the most elaborate machinery is valueless for the purposes for which it is intended without sufficient motive power, and as Dr. Wood has pointed out, some of these State Boards exist only in name, doing nothing to advance the cause for which they were created. Indeed, the difficulties in the way of the prosecution of this work are many and formidable.

One great obstacle to progress is the indifference of the general public, an indifference born of ignorance. A man will promptly avail himself of the services of a physician when he feels himself to be sick. But being ignorant of the various predisposing and exciting causes of disease to which he is exposed, he is slow to adopt any prophylaxis against an unrecognized danger. Or, if perchance, he should be induced to make use of such precautions as science places before him, and thus escapes disease, he is very prone to ascribe his immunity to chance, rather than to regard it as the result of the means employed.

Another serious difficulty is our lack of information as to the actual condition of public health. We cannot urge the necessity for Preventine Medicine when we have no data to which we can refer. For instance, typhoid fever prevailed to a considerable extent throughout the State last fall and winter, but we have no certain means of knowing whether it was more prevalent than usual, or if its mortality ex-

ceeded the usual rate. In other words we have no statistics for comparison.

In this connection I cannot do better than to give you the opinion of Dr. Billings, Vice-President of the National Board of Health.

"At present, the most urgent need of sanitary science in this country is a uniform system of registration of the principle diseases; and next to this, a similar system of registration of births and deaths. The absence of the information which such registration would give, is one of the greatest obstacles to hygienic progress; for it is due to this that our legislators and political economists do not take the hygiene of the people into consideration, except in a few special cases."

The importance of the subject and the necessity for some action in the premises being admitted, the question at once arises upon whom shall this work devolve? Upon whom, if not upon the medical profession, who have in charge the health of the public, and are bound by every consideration not to neglect this charge.

True, we need the active co-operation of the public, conferring legal authority, and bestowing payment for services rendered, but indifference on the part of the laity will not excuse our neglect. The duty of the physician, as formulated by the Hon. Erastus Brooks, is "to reduce mortality among the people at large, to save them from physical pain, and to cure the sick:" and, as we are culpable if, in the treatment of an individual, we fail to give him the benefit of all curative means in our reach, so are we to blame if we do not give the public the same advantages. Some one must do pioneer work in every new enterprise, and it is incumbent on us, as a society and as individuals, to labor earnestly in this work, sustained by a firm conviction that the future will show the good results of our labor.

We must so familiarize ourselves with the whole subject as to have intelligent and decided convictions, which we

can present to, and impress upon, the public until it is sufficiently educated to second heartily our efforts for its welfare.

We should study to know what are the disputed as well as the established points in this science, that we may be in a position to observe intelligently the phenomena of disease occurring before our eyes. Says Dr. Billings: "Every epidemic, great or small, even if there be but three cases showing a community of origin, is an experiment performed for the observer, one which he cannot and dare not perform for himself, and which will never be repeated in all its details. Hence the immense importance of knowing *how* to observe, which, in most cases, includes the knowing what to observe and *what to omit.*"

While educating ourselves we should in every way impress the importance of this subject upon the people. Every physician is an authority among his own patients, and sound sanitary advice given and reiterated by him will at last be accepted and acted upon.

By supporting and seconding the State Board in its work much can be done. The collection of vital statistics for this State is imperatively demanded, and the value of such statistics will be in direct proportion to their completeness and the extent of territory which they represent; and though the value of such work may not be at once apparent, it will become very manifest as the results accumulate.

Under the law enacted by the last Legislature, requiring the return to the tax lister of all deaths occurring in each family during the past year, we may get some approximately accurate statistics under this head, but there is no provision for the registration of diseases or of births, both of which items are as important as the death rate. It would require but little time from each physician to keep a record of the various important diseases which he daily sees, and these records consolidated would be of very great value to

both county and State. Is it asking too much of each physician to give fifteen minutes daily to this important matter?

While this science claims the attention of all, its study is especially incumbent upon the younger members of our profession, for upon us, year by year, will devolve the task of maintaining for our State the honorable place in the line of progress won for her by our predecessors, and we will prove traitors to them and to North Carolina if we neglect or ignore the trust reposed in us.

Let us then vigorously push forward the work already mapped out and begun by our elders, aided by their advice and guided by their experience, that, although we ourselves may not reap the fruits of our labors, our successors may be in a position to know what is the state of public health in North Carolina, and may find a broad foundation laid upon which they may rear a perfect system of Preventive Medicine.

REPORT.

OFFICE OF THE SECRETARY
Of the North Carolina Board of Health,
WILMINGTON, N. C., April 24th, 1882.

To the Medical Society of the State of North Carolina:

Since the last report of your Secretary, the work of the North Carolina Board of Health has been conducted with all the ability and energy possible under a law which provides no means.

The work of the first importance to the intelligent pursuit of State medicine in all its details is the collection and tabulation of

VITAL STATISTICS.

It will interest you therefore to know how this task has been performed by the Board. Our effort in behalf of the collection of statistics, as set forth in pages 10 and 11 of First Biennial Report, was confined to economic statistics, experience showing that without paid assistance, and a compulsory law, that nothing like a regular and correct system of returns could be expected.

The items upon which Superintendents of Health have been reporting monthly for the past two years are included in the following:

WEATHER AND PREVAILING DISEASES.

The population of the county; the prevailing winds; number of rainy days; days of snow; average temperature; the prevailing diseases; the number of cases of small pox, measles; whooping cough; scarlatina; diphtheria; yellow

fever; typhoid fever; pernicious malarial fever; cholera; hemorrhagic malarial fever.

CONDITION OF THE PUBLIC BUILDINGS.

The number of prisoners and inmates in jails, poor-houses, and houses of correction. The cubic space of air allowed to each and the quality and quantity of food and drinking water. The number giving evidence of successful vaccination.

PUBLIC SCHOOLS.

The number, character of buildings, ventilation, condition of outhouses and wells.

SANITARY CONDITION OF COUNTY TOWN.

Drainage and sewerage of streets. Ventilation and heating of public buildings. Detailed accounts of any efforts made to get the attention of the public towards sanitary improvement. General remarks upon any matter appertaining to the sanitary condition of the county, and any suggestions looking to a more careful collection of statistical items.

Reports as above have been coming in with marked regularity from many of the Superintendents, but not more than thirty counties are now reported regularly. The dropping off has been mainly due to the neglect on the part of individual physicians to report to the Superintendents. Indeed many of them are obliged to explain that their reports are made up almost entirely by their own unaided exertions. Whether or not these reports will be worth publishing, cannot be determined until they have been examined carefully and put in a proper shape. The clerical labor necessary to accomplish this end is, so far, beyond the means of the Board.

It was considered worth the trial to get a law enacted by the Legislature for the purpose of obtaining at the annual listing of taxes such depositions as could be easily obtained from each tax lister. It was seen that even if a law could be passed, covering all the items desirable, it would nevertheless fail to be a complete record, as unfortunately the number of persons liable to list taxes would not include a considerable portion of the population. It was also foreseen that of the number of persons liable to taxation, many neglected or evaded the law, making also another discrepancy. All things considered, this seemed to be the best preliminary step to take, and the following law was enacted:

"SECTION 1. It shall be the duty of each and every person annually, at the time when he or she or they shall list property for taxation, to make out and sign and deliver to the township assessor, on a blank prepared and furnished as hereafter provided, a statement as follows, to-wit: 1st. Whether married, unmarried, widow or widower. 2d. Number of births in the family within the year immediately preceding. 3d. Number of deaths in the family within the same time, and the names of diseases causing the deaths, as far as known. 4th. Whether any cases of the following diseases have occurred in the family for the year immediately preceding: Small Pox, Scarlet Fever, Diphtheria, Yellow Fever, Cholera.

SEC. 2. It shall be the duty of the State Board of Health annually to prepare and furnish to the commissioners of each county, at least thirty days before the time appointed by law for the listing of taxes, a sufficient number of blank forms, or lists, in which each tax payer or lister shall make out the statement required by section one of this act, which said blanks shall be distributed by the commissioners aforesaid to the township assessors at least five days before the time appointed by law for the listing of taxes. The form of said blanks shall be prescribed by the Secretary of the State Board of Health, and may be accompanied by a circular from said officer giving instructions in regard to filling out the same and information desired."

SEC. 3. The blanks so made out and delivered to the assessors, as provided for in section one of this act, shall be forwarded by them to the clerk of the board of commissioners in each and every county at the same time required by law for the return of the abstract of the tax list to said clerk. And it shall be the duty of said clerk to forward at once all of said blanks so returned to him to the Secretary of State, who, after noting

the same for record in his office, shall forward them to the Secretary of the State Board of Health.

SEC. 4. This act shall be in force from and after its ratification.

Ratified the 11th day of February, A. D. 1881.—*Chapter 73, Laws of* 1881.

Through the unforeseen inefficiency of the law many delays occurred in the distribution of blanks to the different counties, and although the National Board of Health generously and promptly came to the assistance of the Board, many remote counties failed to receive their blanks until after the time specified by law for tax listing.

The blank sent out to be filled up by the tax lister was made up by the Board of Health, as follows:

VITAL STATISTICS FORM.

(*To accompany the Tax-List Blank, prepared in accordance with Chaptes* 73, *Laws of* 1881, *ratified February* 11, 1881.)

The person about to list taxes will answer the following questions in writing:

Are you Married? Unmarried? Widow? Or Widower?

(*Answer* YES *or* No, *under the proper heading.*)

MARRIED.		UNMARRIED.		WIDOW.		WIDOWER.	
WHITE.	COLORED.	WHITE.	COLORED.	WHITE.	COLORED.	WHITE.	COLORED.

Give in writing the number of Births in the family for the past year.

NUMBER OF CHILDREN BORN.			
MALES.		FEMALES.	
WHITE.	COLORED.	WHITE.	COLORED.

Give number of Deaths in the family for the past year, naming the disease which caused death, if known.

MALES.		FEMALES.		OF WHAT DISEASE.
WHITE.	COLORED.	WHITE.	COLORED.	

Have any cases of Small Pox, Scarlet Fever, Diptheria, Yellow Fever, or Cholera occurred in your family in the past twelve months?

(Give number under the appropriate heading.)

SMALL POX.		SCAR. FEVER.		DIPHTHERIA		YEL'W FEVER		CHOLERA.	
White.	Col'red	White.	Col'ed.	White.	Col'ed.	White.	Col'ed.	White.	Col'ed.

The returns have been sent in by the Secretary of the State, and are being tabulated as speedily as our limited clerical help will allow. It is premature, perhaps, to express an opinion as to the result, but gross carelessness and indifference on the part of the *paid* officers entrusted with the work is everywhere apparent. Occasionally the returns of a whole township show conscientious care, but so far these examples are rare. However, the satisfactory returns point to the possibility of getting correct statistics in this way, and it seems to the Board it should suggest to our legislators the propriety of requiring her paid officers to do her work properly.

The following example is given of the returns from the county of Anson, and will show, perhaps, the most reliable report made:

STATISTICAL RETURN OF THE COUNTY OF ANSON, FOR 1881.

SOCIAL CONDITION.									BIRTHS.				DEATHS.			
Married.		Unmarried.		Widow		Wid'er.		Total.	Males.		F'm'les		Males.		F'm'les	
W.	Col.	W.	Col.	W.	Col	W.	Col		W.	Col	W.	Col	W.	Col	W.	Col
701	368	153	44	63	2	26	8	1,355	99	64	73	63	21	25	25	16

CAUSES OF DEATH IN ANSON COUNTY.

WHITES.

Accident	1
Old Age	1
Cramp	1
Ulcerated Tongue	1
Heart Disease	1
Typhoid Fever	2
Cholera Infantum	2
Hives	2
Cancer	1
Dropsy	1
Croup	1
Consumption	1
Thrash	1
Chill and Fever	1
Congestion Brain	1
Congestion Lungs	1
Pneumonia	1
Lung Disease	1
Bright's Disease	1
Indigestion	1
Paralysis	1
Unknown	13
	37

BLACKS.

Consumption	1
Gravel	2
Scrofula	1
Old Age	1
Liver Disease	1
Heart Disease	1
Typhoid Fever	1
Pneumonia	1
Smothered	1
Choked	1
Croup	1
Hives	1
Dysentery	2
Convulsions	1
Cold	1
Fracture Skull	1
Unknown	21
	39

It may not appear to this Society that what has already done towards inaugurating vital statistics amounts to much, but it must be remembered that ve facilities have been at the disposal of the Board, a money to pay for clerical help. The Board has furn all the means so far expended, and but for this the would have stopped long ago.

The science of statistics was more thoroughly cons in our tenth and last census than ever before. G Walker brought into service every possible means, an ceeded in imparting his enthusiasm to volunteers thr out the country. His appeal to the American M Association to aid him in the collection of mortality tics met with favor. He distributed to every doctor i country whose address could be obtained a memora book in which to record the deaths occurring in his pr for twelve months.

Dr. J. S. Billings, the distinguished statistician an liographer, has made an analysis of these reports, wh may here consider with interest.

To North Carolina 1,706 books were sent. Of this nu 467 were returned to the Census Bureau, 23 reporti deaths and 444 reporting deaths, giving a total of centum reporting. Some States gave a larger percent reports, some less. The report though shows that the been an increase, census by census, of the total re shows a "much more complete result than obtained i vious censuses."

It appears from the census of 1880, by computati those not reporting, that the death-rate would be sta 15 per thousand. Not meaning, however, that in the U States we are actually blessed with such a remarkab mortality, but that the returns were not accurate.

This review shows an increasing interest in the coll of statistics and should serve as an encouragement officials of our State to strive for greater accuracy.

be slow work educating people to the importance of statistical returns, and it is necessary that we should make the best of every phase of progress we can detect. If you can enlist the aid of the press in behalf of this object it will not be many years before the statistical tables of our State will be relied upon. We cannot expect to have success except by slow and difficult approaches. Rhode Island, Michigan and Massachusetts have statistical bureaus, under the charge of competent managers. The necessity of the work is there acknowledged by supplying adequate means for its accomplishment.

It may not be necessary to traverse again the argument for the necessity of vital statistics. The citizen who has not already received this conviction has not gone very deep in the study of preventive medicine. The Board is very desirous that the members of the State Medical Society should give their close attention and continuous support to the measures we have already inaugurated. It is possible to bring this work forcibly to the attention of our representatives before they assemble at the capital. The friends of the work must have thorough convictions though before they can convince others, and we ask that the subject receive serious consideration by every doctor in the State, not only in this connection, but in connection with all the matters of State medicine requiring legislative action.

THE ADULTERATION OF FOOD-SUBSTANCES.

Statements were so frequently made in the daily press, and even special articles were contributed in large numbers on the subject of FOOD ADULTERATIONS, so that it seemed incumbent on the Board to afford to the citizens of the State every opportunity to settle the questions of adulteration and sophistication. This course was more necessary because a large number of the food-substances consumed in this State were derived from the same sources as other food-substances

alleged to be occasionally adulterated or sophisticated in a manner harmful to the health.

The Board of Health issued the following circular:

To Householders and other persons interested in the prevention of the adulteration of Food-Substances and Medicines:

The North Carolina Board of Health, recognizing the wide-spread interest of the public in the rumored frequent adulteration of food-substances and drugs, desires to give every facility to detect adulterations or quiet unfounded suspicions. While the Board does not share in the frequent public statements of the harmful adulteration and cheats in the food we eat, the liquids we drink and the medicines we give, it was deemed advisable to offer as many as desired it, up to the full capacity of the laboratory, analyses of suspected articles.

The list of articles given below need not be the limit of the enquiry, but may serve to direct attention to the classes of articles:

FOOD-SUBSTANCES.

Soda, saleratus, baking powder, cream of tartar, sugar, milk, butter, liquors, flour, &c., &c.

DRUGS.

Paregoric, laudanum, quinine, opium, and such articles as are usually sold for domestic use.

Upon application to the Superintendent of Health of your county, you can procure the necessary information.

THOMAS F. WOOD, Secretary.

A circular was issued to Superintendents of Health requesting them to give such publicity as their means allowed to the fact, that preparation had been made at the Agricultural Station to analyze food-substances and drugs, in such quantities as not to over-tax the ability of the chemist.

In addition to the distribution of these blanks through the mail, several of the most influential papers in the State* inserted the announcement of the Board, asking attention to the matter editorially. So far very few applications have

*The Secretary feels called upon to thank especially the *North Carolina Presbyterian*, *The Morning Star*, *The Daily Review* of Wilmington, and the *News and Observer* of Raleigh, for their aid in bringing prominently before the public the work undertaken by the Board.

been made, indicating that there is not a wide-spread suspicion of food-substances and medicines.

The opportunity offered by the Board is still extended to the citizens of the State, and with the increased facilities of the Chemist of the Agricultural Department, (who by the law is also Chemist of the State Board of Health,) in the new and improved quarters of the Department, increased opportunities will be available for this and similar purposes of the Board.

It is not necessary at this time to call attention to particular nature of the cheats in food-substances and medicines. Our limited experience points to the conclusion that communities suffer not so much from the great harmfulness of substances used for adulteration, but from an economical point of view, by the excessive prices paid for food containing cheap and worthless substances. It is proper to remark in this connection that the excessive zeal of would-be sanitarians, has greatly exaggerated the dangers of adulterations. Very much has been said about the adulteration of sugar and syrup with glucose, as though there was risk to health to consumers of these substances so adulterated. This is not so. Glucose is no way harmful, but is a legitimate article of food. It is an abominable cheat, though, to adulterate cane syrup and sugar with glucose and levulose, and put them upon the market with a fraudulent brand.

The same objections must be made to the often repeated assertions about the adulterations of alcoholic beverages. It is a popular belief that pure liquors do no harm, and that the adulterations alone cause all the mischief. But liquors are not adulterated with expensive materials, particularly in this country, and seldom with harmful substances.

Coloring substances such as burnt sugar and dried apples, and saccharine matter to give a bead to whisky and brandy, are among the most common adulterations. It is useless to disguise the real state of the case, by charging adulterations

with the evil results from beverages, for really the least harmful substances contained in them are those introduced to adulterate. It is alcohol, and alcohol alone that is chargeable with the diseases which ensue from excessive indulgence in beverages. We, as physicians, need not be reminded that cirrhosis, and wrist drop, and drunkard's epilepsy, and a long list of diseases are due to alcohol; but the public needs instruction on this subject.

These illustrations are introduced to serve to show, that good and zealous men, as well as charlatans—false teachers—are endangering the opportunities afforded us, the Board of Health, to accomplish great good by a steady and rational progress in the good opinion of the public, by putting their half-seasoned knowledge, and startling observations before the public. The re-action is sure to follow, and the success of our cause will be delayed just in proportion to our false teaching.

There is some cause of anxiety as far as the medical profession is concerned, in regard to the adulteration and improper quality of drugs. Not all the Cinchona sold under that name would give the tonic and anti-periodic and other therapeutical results claimed for it by our teachers, and expected to result in accordance with our experience, because very few specimens of bark would yield the same percentage of quinia or other alkaloids, and it would be a lucky chance that would enable a physician to secure a specimen of Cinchona bark that would yield 10 per cent. of quinia.

Professor C. Lewis Diehl, a member of the Committee of Revision and Publication of the Ph. U. S. of 1880, made an excellent report to National Board of Health,* on the "*Deterioration, Adulteration, and Substitution of Drugs*," which deserves to be studiously considered by the medical profession. Some quotations from this valuable paper will serve to bring the whole subject more conspicuously before your minds.

*National Board of Health Supplement, No. 6, 1881.

"One need not be a physician to appreciate the fact that satisfactory medication is impossible when the medicine administered is not that designed by the prescriber. It is not sufficient that the medicine should "very nearly" be that which is designed; it should "absolutely" correspond to the standard which the physician has before his mind at the time when he finds it necessary to prescribe it. It is therefore the duty of the dispenser to see to it that the medicines he dispenses conform in every respect to the standard that has been framed for his guidance as well as for the gudiance of the physician. The fulfillment of these conditions depends not alone on the integrity of the dispenser, it depends equally on his knowledge and skill; and unless these are combined with integrity, the prescriber cannot hope for results which the nature of the disease may justify him to expect. Finding that the medicine has not the expected effect, the prescriber may be led to increase the dose, or to replace that originally prescribed by another, without, however, ameliorating the disease or causing it to yield to his treatment. He now, perchance, begins to suspect that the medicine supplied is not as it should be, and, changing his apothecary, soon cures his patient. If all cases of bad medication were as simple in their development as the one illustrated, there would perhaps be no necessity for this report. Unfortunately, however, such is not the case. It quite often happens that the diagnosis being well established, it is urgent that the proper medicine should be promptly administered. If in a case of this nature the medicine should happen to be of indifferent or inferior quality, the life of the patient is placed in jeopardy, and under circumstances sacrificed. Again, the prescriber, conforming the medication to his diagnosis, may be led to reject that originally made, because he fails to obtain the effect which an abundant experience justifies him to expect from the drug administered. In a case of this kind, he may for a time be completely at fault while the illness of his patient is vexatiously prolonged or it may be aggravated. In short, the use of inferior and adulterated medicines may be the cause of protracted disease, of increased suffering, and in some instances of death; and failing to mitigate and cure diseases in which the pure medicine is unequivocally indicated, they may lead the physician to errors in diagnosis, cause him to acquire the habit of prescribing large doses of active medicines, and in fact seriously affect his success and reputation.

Finally, there are many medicines that are in daily demand over the counter of the druggist as household remedies, with or without the sanction of the physician. Many of these are of an innocent nature, and being used for trifling ailments, any variation in their strength is not attended with serious consequences. Others, however, are quite active agents, or contain such. This is particularly the case with preparations containing opium, for all of which commonly dispensed there exist either officinal or other authoritative formulas. It is plainly the duty of the dis-

penser to adhere to such authoritative formulas, whether officinal or not; but from motives of gain and competition the preparations of some shops contain variable quantities of opium, often one-half or less of that which is proper, and this is true equally of the more powerful ones and of the weaker preparations intended for the infant. Naturally the dose of such a weak preparation is increased until the desired effect is obtained, and all works well until the supply is replenished by some conscientious dealer, when, as is unavoidable, an overdose is the result, attended with more or less serious consequences."

Let us take from the ample list furnished by Prof. Diehl a few of the articles commonly prescribed, and examine the amount of impurity or inferiority:

			Good Hope, Socotra, &c.	troduced by process of preparation.	undue quantities. Inferior grades substituted for the more valuable.	purchasing the prepared grades, both whole and powder.
78	Cinchona.....	Imported..	South America, cultivated in East Indies, Java, &c.	.....	Inferior barks are often sold and substituted for those of known value. Spurious barks were formerly met, but are now very rare. Poor barks enriched with chinioidine.	Good barks can be obtained from respectable dealers. There is, however, much inferior bark in the market, which, owing to ignorance or for other reasons, is demanded.
76	Chloroform....	.....do.....	.....do.....	Often insufficiently purifi'd, containing foreign chlorinat'd compou'ds. Liable to spontaneous change when too strong, particularly when exp's'd to light, with formation of phosgene gas.	Impure chloroform sold for pure.	Some manufactur'rs furnish a pure chloroform at fair prices. Others seem to be entirely oblivious to the necessity of furnishing chloroform of even moderate purity.
65	Cantharis.....	.....do.....	Southern and Central Europe and Western Asia.	Suffers by age and exposure; liable to be attacked by mites.	Powder sometimes adulterated with euphorbium. The flies sometimes extracted with alcohol and redried. Rendered weighty with fixed oils. Admixed with other insects.	Variable on account of liability to change.
92	Digitalis.....	Imported..	Europe.....	Liable to mustiness and other changes on exposure.	The leaves of the first year's growth substituted. The leaves of *Digitalis ochroleuca*, of species of *Verbascum*, *Conyza squarrosa*, *Symphytum officinale*, *Inula helenium*, have been substituted, probably ignorantly.	Fair.
95	Ergota	.....do.....	Europe.....	Deteriorates by keepi'g, particularly if in powder; becomes quite rancid. Liable to attack of mites.	The ergot of other graminæ, as barley, oats, &c., sometimes substituted or admixed.	Fair, but liable to vary according to age or care in keeping.
123	Ipecacuanha..	Imported..	Brazil, New Granada, Bolivia.	Extraneous portions of the plant.	Other South Americ'n emetic roots substituted and used as adulterants, such as striated, small striated, undulated or farinaceous, white ligneous, bastard and Indian ipecacuanha, all of which are totally different from the true root.	Fair.

It is not necessary to quote more of this thorough paper to show at what a great disadvantage physicians may be placed by the varying quality of the drugs they prescribe or dispense. The harm here indicated is yearly becoming greater owing to the increasingly wide separation of pharmacy from the practice of medicine. The profession seems to dread the stigma once placed upon the apothecary in the *Seventeenth Century*, by Boyelin. "The druggist must be mindful that he is but the physician's cook," says this quaint old author, but the physician would be far more mindful of his own interests if he knew enough to direct this *cook*, or do the "cooking"—the selection and preparation of his own drugs. This is impossible in most cases, but it does not release the physician of the responsibility of being well trained in pharmacognosy, so that he will have the ability to detect in what particulars any given remedy is not yielding the expected results.

The practice of buying supplies of drugs from dealers who give the best terms and sell the cheapest articles, may cost the physician in the end bitter disappointment, and sometimes great damage to his practice. It is decidedly a retrogression to give up the drilling of students in the appearances and qualities of drug substances. The physician who teaches his students thoroughly the art of pharmacognosy is doing more to bring about a new era in the quality of drugs sold, than the fortunate committee that succeeds in getting an anti-adulteration law through our Legislature.

"THE RELATION OF NOSTRUMS TO THE PUBLIC HEALTH"

is becoming an important public question. A few years ago a chemist by the name of Hoffman issued an almanac as a set off to the flood of patent medicine almanacs distributed in many languages all over the land. Mr. Hoffman conceived the idea that by carefully analyzing the various secret preparations on the market, he would demonstrate

rationally the utter worthlessness or harmfulness of most of them. Singularly enough he got a very feeble support from the medical profession, and the wealthy cure-all proprietors succeeded in silencing him. This was a movement in the right direction evidently, and if it could have been sustained by sufficient means, it would have educated many nostrums out of the market.

Prof. Albert B. Prescott has given careful attention to this subject, and in a communication,* read before Michigan State Sanitary Convention held at Battle Creek in March, 1881, he thoroughly traversed "The Relation of Nostrums to the Public Health."

It would be a good investment by the State Board of Health to publish this paper for the information of the people. An extract from this valuable paper will show the spirit in which it is conceived:

"Now to what extent are the so-called "patent medicines" consumed in the United States, in the State of Michigan, in the civilized world? In the absence of statistics, an estimate sufficient for present considerations may be asked of any person who walks abroad in these days. A few years ago an inquirer drew the conclusion that about eighty million dollars worth are annually sold in the United States, this being at the rate of two dollars for each man, woman and child in our country. This may be below the true estimate. But it is an outlay exceeding that for some things in which we are held to be liberal. For the salaries of all the teachers in all the public schools of this proud State of Michigan the yearly payment amounts to but one dollar and thirty-two cents for each inhabitant. The total expenses in the public schools of the United States do not require payment of over two dollars from each inhabitant. We may claim, then, an equal liberality toward public schools and patent medicines, with partiality toward neither. In England, in 1879, the stamp tax on nostrums was two-thirds of a million of dollars. In Germany, although the law has undertaken to restrict or prohibit them, they are sold in immense quantities, American nostrums competing sharply with those of the *Vaterland*. In spite of regulations by the French Government, Paris is a centre of trade in the nostrums of the world. Russia is plagued with them, and licenses a part and prohibits the rest.

*New Remedies, July and August, 1881.

The Swiss Federation has been trying to prohibit the sale or advertisement of medicines of secret composition. Belgium is setting about to prohibit their importation; she will not tolerate humbugs of foreign origin. The United States taxes them. A single proprietor, perhaps not the most extensive, has paid our government $120,000 per annum for stamps to put upon the nostrums of his own production. At retail, then, the people paid three million dollars a year for this man's wares, and his own annual income was not far from one million dollars. This amount equals the average net income of a railroad three hundred and eighty-four miles long, in the United States, in the year for which this comparison was made. There are extensive wholesale dealers in "patent medicines" alone, and the catalogue of a single house has included fifteen hundred kinds of nostrums. No small share of the trade of the fifteen thousand drug stores, and of a considerable number of grocery stores in the United States, consists in the sale of nostrums, and yet a single "patent medicine king" may make as much net profit in a fortunate year as all the retail drug stores in a city like Detroit, with their patient service of filling prescriptions by day and night, and with their paltry commissions on the nostrums included. How much is paid for advertising nostrums who can tell? Some one has said over ten million of dollars a year. Enough to give over twenty universities of the first class, with free instruction, a better support than Harvard possesses. You have a piece of property to sell, or a legitimate and thriving business to cultivate, and you advertise it liberally in one or two of your local papers, but a man who is putting a pill on the market will fill up a larger space than yours, and his advertisement will be spread out in the newspapers of every city in the country,—his paltry tokens will be displayed along the dead walls of a hundred thoroughfares,—the types may be already setting up translations of his bragadocio in the newspapers of other nations.

"But what is the actual average nature of the nostrums of the civilized world, to take them as they really are—in nothing to extenuate nor set down aught in malice—what is their power upon the body and their influence upon the health of the people at large? We limit our inquiry to such as are distinctively nostrums—that is bearing no practically true statement of their constituents, and we must of course depend upon the results of chemical analysis for our information of the substances that are in them."

"Probably the most extreme illustration of what may be called the tragical side of the nostrum business is to be found in an uncovered view of the operations of the "cures for the opium habit." The writer has analyzed enough of these, and read enough of the feverish correspondence of their victims. In almost all cases the articles consist wholly of morphine, disguised in colored and flavored solution. In a few cases,

quinine or cinchonidine, as a tonic, is substituted for a part and at times for all of the morphine. The strength of the solution, for the same patient, changes from time to time, and changes of the tonics have been found. The operator advertises, with reserve, little more than the words OPIUM HABIT, *cure*, and his address. To inquirers, he invites a letter from the opium-taker himself. When he gets this he is ready. He sends a highly wrought pamphlet, with a vivid portraiture of the power and pains of the habit, made up from the most morbid literature, of this subject, intensified by narrations of the wildest experience, and toned with the most assuring sympathy. It would be enough to drive a susceptible person into the opium habit just to read it. Those who are but slightly addicted to opium, or invalids just beginning to depend on it, take on the impression that they are hopelessly enslaved. But the promise of cure is certain, and the certificates enough to prove charcoal to be white. The remedy is costly, but it is ordered. It comes in fixed quantity to last exactly thirty days, with most positive instructions to take just the required doses of the mysterious liquid, under penalty of great danger from any variation. The patient, for such he is called, begins. At first he is rejoiced that he can do without his morphine, then suspects that there is morphine in the unknown medicine and demands explanations, and makes complaints. Constant correspondence is insisted on, frankness required, and every doubt is met with decision. So the pathetic farce is protracted; on the one side, art and audacity and cold, merciless persistence, on the other side alarm and hesitation and despairing appeals, until the judgment of friends or the service of an analyst dispels the illusion, and leaves the victim to realize that he is sold to his own habit by the one whom he engaged to defend himself against it. Whether the autocrat of the opium antidote ever uses his control to diminish the supply of the narcotic, and weaken the habit, cannot be positively declared, but such cases have not been found. And for this nostrum vendor, certainly the symbol of the spider and the fly would be too tame a trade-mark, and his own service with chain and ball not too severe a retribution."

Enough has been quoted of the work going on to check adulterations to show that we too are responsible for our share in this duty, and we could not better enlist our energies than in this field. We can promise ourselves more lasting results than by reiterated resolutions at our annual assemblies.

VACCINATION.

The following correspondence on the subject of vaccination is submitted:

AMERICAN PUBLIC HEALTH ASSOCIATION,
SECRETARY'S OFFICE, Boston, February 10, 1881.

DR. THOMAS F. WOOD,
Secretary North Carolina State Board of Health, Wilmington, N. C.:

DEAR DOCTOR: I have the honor to transmit the following resolution of the American Public Health Association, as offered by Dr. Jas. H. Letcher, of Kentucky, (amended by the Executive Committee,) and adopted by the Association at its eighth annual meeting, at New Orleans, La., December 10, 1880:

"WHEREAS, There are annually occurring in our large centres of population, and frequently in the provincial districts, numbers of cases of sickness and death from small pox; AND WHEREAS, the only certain method of restricting and preventing this loathsome disease is by vaccinnation and revaccinnation: therefore,

Resolved, That the Boards of Health of the several States in the Union, or where no State Boards of Health exist the State Medical Societies, be requested to take the matter under immediate advisement, and direct the attention of all local Boards of Health to the importance of seeing that all persons in their respective districts are properly protected by vaccination."

I am, with esteem, faithfully yours,

AZEL AMES, JR., *Secretary.*

NORTH CAROLINA BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
THOMAS F. WOOD, M. D., Secretary.

WILMINGTON, N. C., Feb. 15th, 1881.

To the Superintendent of Health of ..... County:

SIR:—I transmit to you a copy of a resolution passed at the last meeting of the American Public Health Association. Notwithstanding the State law on the subject, I regret that little attention has been paid to vaccination by the County Boards. I am aware this has been in some measure due to the incompetency of the law, but as far as my means of observation has served me, there has been apathy apart from all this.

I take this opportunity of submitting some questions regarding the condition of the population in relation to vaccination, and would be obliged if such observations as occur to you on the subject be fully given. The ultimate object is to embody your answer in the next biennial report to the Legislature.

Yours very truly,

THOMAS F. WOOD.

QUESTIONS ON VACCINATION.

Has there been any small-pox in your County in the last five years?
Has vaccination been practiced generally?
From what source has your virus been procured?
What difference, if any, do you observe in the vaccine vesicles from:
(*a.*) Animal virus;
(*b.*) Humanized virus.
What amount of successes do you have from primary vaccinations?
What amount from revaccination?
Does there seem to be any lack of confidence as to the protective power of vaccination among the people?
Has any provision been made by the authorities for vaccination of inmates of Poor House? Prisoners in jail? Or Schools?
Please make any remarks on the subject which these interrogatories do not cover, as the design of the State Board of Health is to know the status of vaccination in the different counties.

It happened during the year that a more potent impulse was given to the subject of vaccination, than circular letters from the Boards of Health. Small pox broke out with great violence in Richmond, Va. The National Board of Health pronounced it epidemic, upon insufficient grounds, probably. In January, six cases of confluent small pox, and four of varioloid, showed themselves in Winston. The Board of Health of Forsyth county, with great energy and discretion, acted promptly in stamping out the disease. Vaccination was very generally performed at the public expense and by physicians in their private practice, so that no new cases appeared there.

In March, two cases of varioloid were discovered near Franklin, Macon county. These were promptly quarantined, and successfully suppressed. Vaccination was extensively performed by Dr. S. H. Lyle.

In April, a case of varioloid was discovered by Dr. John T. Schonwald on board the brig Cora Green from New York. This vessel unloaded her cargo at the Navassa Guano Works four miles above the city of Wilmington, before it was known that there was a case of varioloid on board. On her return to the city she was promptly towed down to the Lazaretto at Mt. Tirzah, four miles below the city, the officers and crew of the vessel were vaccinated, and no new cases made their appearance.

Many thousands of vaccinations in the aggregate were done in Wilmington, Winston, Salem, Greensboro', Charlotte, Goldsborough, Raleigh, Newbern, Fayetteville, Asheville, Salisbury, Warrenton, Chapel Hill, Wake Forest, Durham, Hillsborough, Weldon, Wilson, Tarborough, Greenville, Washington, Raleigh and Goldsborough Insane Asylums, Navassa Guano Factory, Pittsborough, Smithville, Selma, Statesville, and many other points in the State. The records sent in are not sufficiently accurate to be of any use. Heifer virus was very largely if not exclusively used.

In accordance with the law bulletins were issued in the form considered best adapted to the exigencies of the occasion, in the pamphlet which is here submitted:

Vaccination.—Advice from the North Carolina Board of Health on the Necessity of Vaccination; the Tests of Genuine Vaccination; and the Quality of Vaccine.

No argument is so potent in influencing the people to vaccinate as the presence of small-pox. Even those who calmly discuss the question when at a distance from the disease, and are inclined rather to take issue against the preventive power of vaccination, easily take the benefit of the doubt, when a case of small-pox comes close to them, and procure vaccination without delay. This is deemed an opportune time to issue a circular of warning and advice on the subject of VACCINATION, because of the appearance of small-pox in several States. Only a few cases are known to exist in one locality in this State, but its prevalence elsewhere, and the facility of communication of remote towns with each other, makes it highly probable that it will spread to a considerable extent.

THE VALUE OF VACCINATION.—Vaccination, if done with genuine fresh vaccine matter, is absolutely protective against small-pox. The hundreds of physicians and nurses who have been repeatedly exposed to small-pox, and have time and time again escaped from having even varioloid, attest its potency. In countries where compulsory vaccination has been enforced the number of deaths from small-pox is insignificant. American opinion is little divided on the efficaciousness of vaccination, and it is not deemed necessary to enter into an argument on the subject.

It is well known, though, that during the war and for a few years after the war, the protective power of vaccination was very seriously doubted by many, and dreaded by a great many more, because it seemed that the dangers of vaccination were as much to be dreaded as small-pox. It may be necessary, therefore, to explain the reasons of this eclipse which darkened the brilliant reputation of this great prophylactic, for it is still fresh—painfully fresh—in the minds of some.

The source of vaccine in this country was very variable and uncertain up to the year 1870. Vaccine crusts of *humanized vaccine*, (that is, vaccine procured by inoculating persons from arm to arm during many generations) furnished the entire country with virus. Those persons who paid the most attention to its propagation observed the utmost care that vaccine cultivated upon the arms of the healthiest children should only be employed and distributed as seed. When the war broke out, and large numbers of soldiers were brought together in camps, it became necessary to vaccinate and revaccinate the most of them. There was no known adequate source of vaccine at the time. In the Southern army anything went for a vaccine scab. Every soldier and every soldier's wife was a vaccinator. Without any knowledge of the condition of health of the person furnishing the scab, and without any knowledge of how a genuine scab should look, so-called vaccine matter was selected for seed, which was nothing but dried pus, and spurious vaccination was scattered broadcast. The exceedingly filthy sores produced by this matter was popular evidence that the vaccination had "taken" very well, and served to recommend it to neighbors who had not had the good fortune to be inoculated with it.

The spread of spurious vaccine among the soldiers and citizens of the Confederacy caused serious trouble to very many, several persons losing their arms, and many being sadly maimed by it, and of course none of them were protected by it. Indeed the so-called vaccination was practically nothing but the transplantation of purulent "matter" from one

person to another, yielding crops of foul ulcers and skin diseases of many degrees of severity, from contagious porrigo to syphilis.*

The two causes, therefore, which brought vaccination into disrepute, were the ignorant selection of seed, and its transplantation from one bad soil to another, until it at last bore no resemblance to the original seed planted, and many times was fraught with the severest calamity to the patient.

Fortunately now we are enabled to clear up all this history of vaccine disaster, thanks to the unremitting zeal of Dr. Henry A. Martin, of Boston.

Dr. Martin had been a student and propagator of vaccine for many years previous to the war, but the extensive field of study which the army put within his reach, had impelled him toward a solution of the difficulties he had encountered in his army experience of procuring reliable vaccine. It is not necessary to relate the whole story, but suffice it to say that he conceived the idea of importing the natural, spontaneous virus, which had made its appearance at Beaugency, in France. This was successfully done in 1870, (Sept. 23) and from that day can be dated the beginning of a radical reform in the practice of vaccination, a reform that can hardly be overestimated.

The practical results which issued from the introduction of *animal vaccine*† may be summed up as follows:

1. *Vaccine has been restored to all of its original activity and purity.*

2. *As it is propagated from one healthy heifer to another, by inoculation, the seed is propagated in its original soil, and does not degenerate.*

3. *It can be said that* ANIMAL VIRUS, *(unlike the virus obtained from the human subject,) never imparts any of the diseases (such as erysipelas, syphilis, porrigo, &c., &c.,) that humanized virus has been known to communicate.*

4. *That animal virus in the hands of experienced propagators can be supplied in quantities equal to the greatest demand, at reasonable notice.*

5. *That it is possible to procure enough original virus direct from the heifer to avoid the harmful practice of tapping forming vesicles, from which to inoculate others.*

6. The expensiveness of the outfit necessary to carry on successfully the propagation of animal virus is so considerable that it is more likely that but few persons will undertake to propagate it, and that the warrant of the genuineness of virus these propagators are able to give is worth something.

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*Dr. Joseph Jones, of New Orleans, by direction of Surgeon-General Moore, of the Confederate States, investigated spurious vaccination, and found that the foul ulcers called vaccination were due, for the most part, to the spurious matter transplanted from one scorbutic soldier to another.

†Animal vaccine is a term applied to vaccine directly from the cow.

7. The proportionately large number of cases of revaccination which take, shows the potency of this virus, as compared with humanized virus of many generations of attenuation.

Having explained how the degeneration of vaccine matter took place in the South during the war, and having pointed out the regeneration of the virus and its restoration to its pristine purity, clearing up all the doubtful points raised in the minds of the people, we will next consider

WHAT IS A SUCCESSFUL VACCINATION?

It is a matter of the utmost importance that there should be some definite meaning attached to the phrase "successful vaccination." Many ask the question anxiously about themselves. We answer, that the best evidence of successful vaccination is *the possession of a good vaccine scar*. This is not absolutely sure but it is the best we have. A vaccine scar from a recent vaccination will be proportionately fresher and more distinct than from a vaccination more remotely done. It should be wheel-shaped, or oval, about the size of a three-cent nickel; it is usually whiter than the surrounding skin; it may be either depressed, with radiating lines, or it may be elevated slightly, except the periphery which is somewhat depressed. The scars from animal virus spoken of above are more sharply cut, larger, with more distict radiations, and, of course, more conspicuous. The old stock of humanized virus gives us a superficial, small, white scar, with slight indentations over it, these indentations answering to the follicles of the skin. Really no vaccination is absolutely certain that has not been put to the test, but it is a good criterion to go by, that a person in the possession of a clear-cut, well formed vaccine scar, will hardly get the small pox in an intense degree, even though the operation may have been done many years previously. With animal virus, we frequently get successful vaccinations in the persons of those having previous good marks, and in cases in which long humanized virus has failed.

It is held in Great Britain and Germany that the number of scars is the best evidence of protection. But this does not hold. For the writer of this has recently seen a German sailor marked by many beautiful and typical vaccine scars, so clean cut that it was possible to get an impression in wax from them, but who yielded a good vaccination from animal vaccine, the interval from the first to the second vaccination being fifteen years.

The theory that the protective influence dies out every seven years has no foundation.

HOW OFTEN SHOULD ONE BE VACCINATED?—The prudent man always takes the benefit of the doubt, and before running the risk of small pox, has recourse again to revaccination. Experience shows that an in-

fant vaccinated at the usual time, from two months to one year old, will require revaccination on arriving at puberty—say from twelve to sixteen years of age. Some will become susceptible before that, but many more will resist all future attempts at revaccination, especially if the primary vaccination was thorough. It is better to be revaccinated on every appearance of an epidemic. There is no greater risk during an epidemic, than at any other time, of having bad results from vaccination. It is best, as a general rule, to vaccinate a child at from two to twelve months, revaccinate at puberty, and then be guided by the character of the scar whether it is further necessary, unless an epidemic approaches; then revaccinate without delay. While it is a fair inference that a person susceptible to vaccination is also unprotected from small-pox as long as vaccination will take, it is not absolutely certain that this is so.

A PRIMARY VACCINATION.—It is very necessary that the first vaccination,—the primary vaccination,—should be done with great care. A failure in the first attempt casts doubt on all subsequent operations, and dangerously misleads. We often hear persons declare that they were vaccinated, whereas, when we come to examine their arms we discover that the scar or mark is not as it should be, but still the person is relying upon its protective power because the vaccination was done during infancy, and the tradition about it may be that it was so good that some doctor desired the scab. A primary or first vaccination should be exhibited to the physician who performed the vaccination, during the next six or seven days, for his inspection and approval. If the resulting vaccination is not satisfactory, it should be repeated without delay. So very few infants are really insusceptible, that a failure suggests forcibly that the operation was not thorough, or that the vaccine used was not active.

A REVACCINATION.—Persons vaccinated for the second or third time, *should be vaccinated with animal virus*, for if humanized vaccine is used, the chances of getting a genuine result are not so good. Revaccinations are done generally in times of alarm, or upon persons about to travel, or upon persons about to join a life insurance society. In either case a good vaccine vesicle will be very desirable, and the operator will get considerable credit for making it "take" well. Successes will be accomplished in far more than half the vaccinations done with animal vaccine.*

THE USE OF SCABS OR CRUSTS.—It is still very much the custom to use vaccine scabs or crusts taken from the arms of vaccinated persons. This method was introduced by Dr. Bryce, a Scotch physician, and has served a most admirable purpose for half a century. A vaccine scab is composed of dried lymph, pus, epithelium, and some trace of blood. If we give credence to the dangers pointed out by the most eminent surgeons as to the danger of septicæmia or blood-poisoning from the inocu-

*The successes reach nearly 70 per cent.

lation of purulent matter, and consider how many times crusts are used that have been exposed to heat and moisture sufficient to set up partial decomposition, and furthermore remember how many physicians dissolve or make a paste of these crusts and carry them between glass pieces and so put the "matter" in a favorable state for alteration and decomposition, the wonder is that we do not see a great many bad vaccinations from "scabs."

There is certainly a considerable degree of danger from this source, as we have already mentioned in the account of that sort of vaccination during the war, but it would still be by far the best vaccination we could obtain, had not the cultivation of vaccine been reduced to a rational system by Dr. Martin. In the hands of a careful physician, vaccine from one to ten removes from the heifer will give excellent results. It is cheaper; the resulting vesicles are by no means to be despised.

But we surmise that few persons who are well informed about the possible dangers of vaccination from a scab, and the absolute freedom from danger by the use of animal virus, would not greatly prefer the latter when it could be obtained.

We take this occasion to say that a vaccine crust should not be prepared for vaccination in larger quantities than are needed for immediate purpose. That it should never be moistened with saliva, but always with pure water or glycerine. Glycerine has the advantage of being a preservative fluid.

THE USE OF QUILLS OR IVORY SLIPS.—Quills prepared by scraping or boiling, and lancet shaped ivory slips, are smeared with vaccine virus in a thin film, and in this way it is preserved very well for a longer time than when the fluid is collected in glass capillary tubes. In this way the vaccine fluid dies rapidly, and is thus preserved ready for use. The great advantage of the ivory point is that it is shaped in such a way as to be used as a lancet, and is so cheap that it may be thrown away after once using. Its use avoids the risk from using a dirty lancet, and leaves no room for the patient to charge the physician with carelessness if any unusual course follows the vaccination. The ivory slip charged with vaccine directly from the cow is used to complete the entire operation of vaccination, enabling the physician to assure his patient that the pedigree of the vaccine is good, and that the instrument was never before used on any one.

OTHER METHODS.—The old fashion of impregnating threads with vaccine virus, and inserting it under the skin is no longer used, although it may be resorted to if we did not have superior resources.

A method employed by President Thomas Jefferson (see Dr. Martin's excellent historical account of Jefferson as a vaccinator in the January number, 1881, North Carolina Medical Journal) was novel, and may be turned to good use now where animal virus cannot be had. Prepared

crusts or threads or quills were put in a bottle and hermetically sealed, and this bottle placed in a larger one containing water, and the whole tightly corked. We have not spoken of all the devices for the preservation of vaccine, but enough has been said to convince the reader that vaccine virus must be kept with care, in order for it to produce a good result.

HOW TO PREVENT AND EXTERMINATE SMALL POX.

Vaccination in infancy, revaccination at puberty, and where there is not a distinct vaccine scar, revaccination on the importation of small pox into a community, is the well proven plan to prevent small pox. None should be allowed to escape the vigilance of the health officers. The greatest danger in every community is from the more ignorant, and consequently the more prejudiced classes. Compulsory vaccination should be attempted by every town, village and hamlet. It is cheaper to furnish vaccination at a great expense than to allow one case of small pox to get into a community. The city of Wilmington has spent as much as $500 a case for the care of small pox, and during the epidemic of 1865–'66 as much as $12,000 were expended before we were rid of the vile disease. Thorough vaccination, which was then impossible, would have saved it all.

A lesson of the expeditious management of small pox is fresh in the minds of some of us. Last year a sick sailor came into the port of Wilmington, and three days after he was sent to the Seaman's Home Hospital, (on Dock street, in a thickly settled portion of the city) small pox broke out on him. At 11 o'clock the disease was recognized. All the sailors, fourteen in number, in the same ward with him, were vaccinated, and in four hours from the time the disease was recognized, the patient was carefully and comfortably transported four miles down the river to the dismantled pest house, with a nurse and provisions, bedding, furniture and medicine necessary for his comfort. Vaccination was promptly done at the expense of the city, and quietly and without panic or mishap, the disease was stifled in the very outset. No other case occurred.

This lesson in preventive medicine we like to hold up to the people of the State, to show what can be done by quiet, energetic action. This example also serves to answer the question how can small pox be exterminated?

SMALL POX HOSPITALS.—The best plan for the construction of a hospital for the reception of small pox patients is the pavilion plan. Large tents, with flies, furnished with board floors, warmed by small sheet-iron stoves, fulfils the requirements necessary for the successful treatment of these cases. When the cases are ended, all the material

should be destroyed by fire. Small pox patients require well ventilated, cool, airy apartments.

THE DUTIES OF COUNTY SUPERINTENDENTS OF HEALTH ABOUT PUBLIC VACCINATION.—Superintendents of Health are required by law to vaccinate all persons applying free of charge,* and they are also required to revaccinate all persons admitted into jails, poor houses and work houses, if they find it necessary. Unfortunately for this demand of the law, no means are provided for the Superintendent of Health by the State, to purchase vaccine. The modest sum of Two Hundred Dollars was asked for, but the last Legislature did not feel able to provide the State Board of Health with this small sum to meet the emergency that is now upon us. The requisitions therefore that may have been made upon the Secretary of the Board cannot be filled unless accompanied by the cash. The command made by the State law that "the Secretary of the State Board of Health shall keep a supply of fresh animal vaccine virus at his command" has been complied with, but no thanks to the State of North Carolina for his ability to do it.

It will save the Secretary of the Board some trouble and expense, by replying at this place to the numerous enquiries addressed to him for information about where to get vaccine virus.

There are many vaccine farms in the country. Two in Boston, one in Philadelphia, two at Chambersburg, Pa., one at Fond du Lac, Wisconsin, one at St. Louis, Mo., and perhaps others. We have had experience with vaccine from the Pennsylvania Vaccine Company, Chambersburg, Pa., and that of Dr. Martin, of Boston, (27 Dudley street.)†

ONE LAST WORD OF ADVICE ABOUT THE USE OF ANIMAL VACCINE.—The vaccine directly from the heifer is slower in its course than the old humanized virus. Frequently it does not produce a vesicle earlier than the fifth day, and sometimes as late as the seventh, and the crust is not dropped until from the twenty-first to the twenty-fourth day. It will also be observed that there is greater constitutional disturbance, and that (rarely) a general eruption will follow.

The patient should be told that the constitutional symptoms will be more severe than by the old method, and every care should be observed that no injury from pressure of a too tight sleeve, or by abrasion or scratching, as troublesome sores may result.

CAUTION ABOUT THE MANAGEMENT OF THE VACCINATED ARM.

There is good reason to believe that a vaccination that runs its course undisturbed affords the best protection. Vesicles should not be tapped

*The Superintendent of Health would not be expected to furnish virus at his own expense, and it would be a pitifully mean county that would not pay the Superintendent extra for this service, notwithstanding the terms of the law.

† Dr. H. A. Martin & Son sell seven ivory points for $1.00, or fifteen for $2.00.

to furnish vaccine for other persons. The vesicle should be protected by slitting the under sleeve of the shirt, to avoid friction and pressure, and by a loosely fitting sleeve, the vesicle being covered with a cloth greased with suet, cosmoline, or any petroleum jelly, and all covered with a fold of cotton batting. Sometimes it is necessary to treat the sore resulting after the scab drops. A weak solution of white vitriol (sulphate of zinc), five grains to the ounce, applied several times daily, will generally suffice. Itching is generally overcome by freely applying petroleum jelly.

PREVENTIVE MEDICINE.

The most important duty a Board of Health can accomplish is to prevent sickness. For many years it has been known, as well by the people as by the doctors, that the fevers occurring among the vessels in our tide-water streams was preventable, in a marked degree. Observations extending over a space of time marked by four or five generations, demonstrated that the cause of sickness among sailors was due very largely to sleeping on board vessels in the Cape Fear River particularly. This fact was so firmly established in the opinion of merchants in Wilmington, that $20,000 was subscribed to build a home for seamen, in which they might find a safe retreat from the effluvia of the river, and what is not exactly pertinent to the present subject, to escape also the venereal effluvia of low sailor lodgings.

In this building ample provision was made for the accommodation of many more sailors than ever visit the port of Wilmington at one time, and by the Christian benevolence of one of the oldest citizens of that city who had himself been a sea-captain, a house of worship, supplied by the yearly ministrations of a preacher, was provided, to throw around these "toilers of the sea," a beneficient influence.

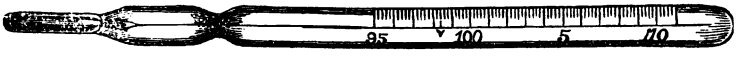
The Board of Health, therefore, issued a pamphlet, entitled "A Guide to Shipmasters Visiting the Cape Fear River," a copy of which is herewith transmitted. It may not be necessary to make the statement, but this is the first example of preventive medicine being founded upon an in-

strument of precision, and is only mentioned in this place that it may suggest the employment of other means of precision in the same service.

Advice to Shipmasters for the Prevention of River Fever—The Fever Thermometer—Its Uses.

The use of the thermometer to indicate the existence of fever is now established beyond doubt. It has been shown by thousands of observations that the heat of the body in any part of the world—in the tropics or the arctic circle—varies very little from 98.4° Fahr., in a grown person, in health. Upon this settled observation is based an estimate of the amount of fever in any given case.

The fever thermometer differs from the ordinary instrument in being self-registering. In the figure a thermometer is shown with the index just below 95°. This index is a slender line of mercury separted from that in the bulb by a slight space, and in a good thermometer the index does not fall back and unite with the mercury in the bulb.



TO READ THE THERMOMETER.—The instrument must be examined and the index must be below the arrow seen at 98.4°. If it is above it can be shaken down, either by holding it firmly between the finger and thumb and shaking forcibly as in flirting the ink out of a pen; or, by taking the instrument at its upper tip, the end opposite the bulb, elevating the hand as high as the head, and, by a smart impulse downwards, thus shake the index below the arrow.

The instrument is put under the tongue, or between the teeth and the cheek, the lips closed upon it, and it is allowed to remain at least three minutes by the watch.

On removing the instrument, an examination of the index will show the temperature, which is indicated at the upper tip of the index, that is, the end of the index the farthest from the bulb.

WHAT A RISE IN TEMPERATURE MEANS.—For the purposes of the instruction intended to be conveyed, it is safe to assume that every degree of heat beyond the arrow is a degree of fever.

The following table will show the relation between the pulse and the temperature of the body:

An increase of temperature of ONE DEGREE above 98° Fahrenheit, corresponds with an increase of TEN beats of the pulse per minute. (*Aitken.*)

Temperature	98°—	Pulse	60.
"	99°—	"	70.
"	100°—	"	80.
"	101°—	"	90.
"	102°—	"	100.
"	103°—	"	110.
"	104°—	"	120.
"	105°—	"	130.
"	106°—	"	140.

The rule above is subject to some variation, but is a fairly good guide.

It is well known that 101° before 11 A. M., indicates an approaching fever, and that the same after 5 o'clock, a declining fever; and so on with every degree above it. 103.5° is about the average of the malarial fever of the rivers. Many severe cases reach 104.5° and 105.5°. Even 106° is not surely fatal, but beyond this, in the most favorable conditions, the danger is very great. 108° to 110° is most surely fatal.

With these introductory remarks we will call the attention of shipmasters to certain precautions, which long experience in this latitude has shown necessary to be observed.

The fever occurring amongst the seamen who visit this and other Southern rivers is malarial. It is due to the exposure of sleeping on board vessels, and keeping late hours at night.

THE NATURE AND COURSE OF RIVER MALARIAL FEVER.—It commences sometimes with a chill. The chill is either a shaking ague, or sometimes the only symptoms are coldness of the fingers, blue nails, cold nose, and ears and toes. Both forms may be an essential part of similar fevers. A chill may last from half an hour to two or three hours, and is always followed by fever. Chill is only a cold stage of fever, and the thermometer will most always show from 100° to 102° even when the chill is highest. The fever comes on, the coldness of the skin gradually goes off, and the heat of fever follows, the temperature rising gradually to 103.5 to 105°.

For instance, if the chill comes on before 11 o'clock A. M., as it often does, the fever will reach its height usually by 5 o'clock P. M., and then gradually decline, either by copious sweating or an abundant discharge of urine. If the fever goes entirely off it is *intermittent.* If it merely declines it is *remittent.* In either case a person seized with fever may look for a return on the succeeding day, or the day after. These are forms of the same fever and have all been named. Thus we have them coming on *daily*, *twice daily*, *every other day*, *every third day*, and so on; but the fevers are essentially the same, being practically cured by the same treatment.

THE WAY TO AVOID RIVER FEVER.—Live temperately, and do not sleep in the river on board vessel during the months of August, September and October. The air of the town is perfectly harmless to most persons, and especially those who go to bed early, and are not intemperate.

Sleeping on board during the months named does not always cause sickness, but it does nearly always. Sometimes fever does not develop until a vessel gets to sea, and then all hands may be taken down at the same time. Such cases are known.

PROPHYLACTIC:—The daily use of quinine or the preparations of peruvian bark, *will prevent fever*. It is a good practice to give to crews of vessels a daily morning dose equal to five grains of quinine. Some of the cheaper preparations of bark answer this purpose very well. None of them are equal to quinquinia, a preparation tested now during several seasons, and found to be remarkably efficient. It contains 15 per cent. of quinia and 45 per cent. of other valuable alkaloids of peruvian bark, which really gives it an advantage over the sulphate of quinine usually sold. It is recommended with great confidence.

WHAT TO DO AFTER THE VESSEL GETS TO SEA.—In every case of complaining on the part of a seaman, the Captain or an intelligent officer should take the man's temperature. If it is more than 98.4° he will be wise to conclude that there is a fever approaching. 100° or 101° is absolute evidence, apart from any other condition of the man, that he has fever, and it is tolerably certain that if it is not checked he will have more the next day.

WHAT TO DO IF THE TEMPERATURE RISES.—No amount of fever should prevent the patient from taking *quinine*, or some other preparation of bark in the proper doses. It is always best to commence quinine early in the morning because the fever increases towards noon, and with the increase of fever comes on many times such a sick stomach that the patient cannot retain the much needed medicine. But if the stomach does not reject it he ought to have his medicine in proper quantities, notwithstanding the fever, for every day of its continuance unaffected by medicine, lessens the chance of recovery.

WHAT MEDICINE TO GIVE.—If the fever is detected early, medicine should be given at once. It is necessary usual to give *twenty grains of quinine* every twenty-four hours. *More* is needed sometimes, but it is not often that a less quantity will succeed. It is best to direct* five grains of *quinine* in pills every two hours, commencing as early as four o'clock in the morning, until twenty grains are given. Should pain in the head and hot skin, and unpleasant "singing" or "roaring" in the ears, trouble the patient, *bromide of potash* should be given in ten grain doses*, dissolved in water, every two or three hours. Usually a very hot

*See formulas on the last page.

and dry skin yields to the action of the remedies above. Should they fail, *fluid extract* of Jaborandi should be given, fifteen drops every hour until copious sweating comes on.

Constipation is sometimes an accompaniment of this fever, and should be relieved by *Calomel and Soda at night, or Epsom Salts and table salt in the morning.*

Relapses are not uncommon, and although the thermometer may not indicate fever after a few days of treatment, (and it is urged that the thermometer should be carefully applied morning and evening,) it is never safe to withdraw the quinine the day following the one on which the patient misses his fever. At least *ten grains* should be continued daily for three or four days in succession.

RECAPITULATION.

1. The thermometer is a sure guide in the early detection of River Fever.
2. Whenever a man shows any indisposition after a stay on the river during the months of August, September and October, apply the fever thermometer, and if he has 100° or over, you may look out for more fever the next day.
3. Quinine should be given in five grain doses until twenty grains are given before noon. No time should be lost.
4. Relapses can be prevented by continuing the medicine four days in succession after the last indications of fever.

FORMULA 1.—QUININE PILLS.

Take of

Quinine, two scruples or forty grains,
Tartaric Acid, ten grains,
Glycerine, twenty to twenty-five drops.

Mix well, and make twelve pills. Roll in magnesia before putting in a box.

One pill every hour until six are taken a day.

2.—QUININE SOLUTION.

Take of

Quinine, forty grains,
Tartaric Acid, thirty grains,
Water, two ounces or four tablespoonsful.

Mix and make a solution.

A teaspoonful every hour until six doses are given each day.

3.—BROMIDE SOLUTION.

Take of

Bromide of Potassium, one ounce,
Sugar, two tablespoonsful,
Water, eight tablespoonsful.

Dissolve the bromide in the water and add the sugar until all is dissolved.

The dose for headache, and for the excitement caused by quinine, is a teaspoonful every two hours.

A little lemon juice or hydrobromic acid makes the solution pleasanter to take.

4.—QUINQUINIA SOLUTION.

Prophylactic.

Take of

Quinquinia, one ounce,
Tartaric Acid, half an ounce,
Water, three pints.

Mix and make a solution.

Dose, a tablespoonful every morning.

5.—QUINQUINIA SOLUTION FOR FEVER.

Make as in the solution of quinine and in the same quantities.

6.—QUINQUINIA PILLS.

Make the same as quinine pills and in the same quantities and doses.

7.—CALOMEL AND SODA.

Purgative.

Take of

Calomel, six grains,
Bicarbonate Soda, twenty grains.

Make a powder and mix in a spoon with syrup.

8.—EPSOM SALTS AND TABLE SALT.

Purgative.

Take of

Epsom Salts, one-half to one ounce,
Table Salt, one teasponful.

Mix and make a solution in a cup of water. To be taken before breakfast.

DISPOSAL OF GARBAGE.

Another subject of importance to the well-being of cities and towns in this and all other States, is what to do with the garbage that is daily accumulating, and which, if not removed, is unsightly and offensive, and which finally causes disease. Public officials preside over our towns generally just long enough to learn the state of the finances, but seldom long enough to make any sort of sanitary study a business. In times of emergent trouble they appeal nervously to Boards of Health to do something effectual and instantly; but as soon as the passing trouble is over, they forget the duty of informing themselves on sanitary matters. A municipal officer who persistently and conscientiously studies all that is known of the sanitary work of cities, and who makes the performance of sanitary functions a steady matter of business, is a rare functionary. Few of them know that there is a published system of garbage removal applicable to the needs of towns, small and great. Still there is such information to be had, and the North Carolina Board deemed it a duty to circulate information, reiterating much that is known, and pointing out much that is new, on the subject of the disposal of garbage. If there is a town in the State that has any good system, it has not come to the knowledge of the Board of Health. A copy of our pamphlet is appended for the information of all concerned. (All of these pamphlets may be had for the use of corporations free of charge, and in any desired numbers.)

THE DISPOSAL OF GARBAGE.*

The word garbage as used in this communication, means *house offal, ashes and dry house dirt, street sweepings, the contents of privy vaults and*

*The substance of a paper read before the New Hanover County Board of Health in May, 1881.

cess-pools, *dead animals*, and all refuse which by accumulating is unsightly or noisome.

The disposal of garbage has received too little attention in most of our towns. The construction of sewers has developed some high skill in engineering, while the disposal of garbage is left to the street cleaner to do the best he can with the means provided him. It cannot be doubted, though, that the prompt and careful removal of garbage is a prime necessity in the conservation of the public health, or that its neglect or slovenly performance gives a bad reputation to a city, which is of course a damage to its commercial interests. We have an illustration of this in the recent demonstration in New York of the citizens of all classes, coming together in a public meeting to demand that the Street Commissioners should be held up to their duty in keeping the streets clean. Neglect of ordinary cleanliness of the streets, in the opinion of physicians and others, was a fruitful source of the increased sickness and mortality in the neglected quarters of the city. It is hardly necessary in this place to argue the necessity of the disposal of garbage.

In a very excellent article in the *Sanitarian* for July, 1881, Dr. O. W. Wight, the veteran sanitarian of Milwaukee, speaks thus forcibly of the accumulation of human excreta:

"The privy vault should not be tolerated in any civilized neighborhood. Where there is no sewer system some form of earth closet ought to be used, and the contents frequently removed. The liquid portion of the excreta of horses and other domestic animals should be constantly removed by the sewer system. The solid portion should not be thrown upon the ground and bleached by the rain, but be kept under cover, dry, and frequently carted away. In fact, no organic matter should be thrown on the ground, nor deposited in the ground near human habitations. The soil where man dwells is sacred, and it is sanitary sacrilege to pollute it. He who fouls the air that he breathes himself, or the water that he drinks, or the food that he eats, is a barbarian who might learn wisdom from the cat, or decency from any swine not demoralized by contact with man. He who fouls the air that another must breathe, or the water that another must drink, or the food that another must eat, is a criminal, to be classed with those who maim and kill.

"There are more reasons for such care in the removal of organic wastes from inhabited places than appear on the surface. The chemistry and hygiene of putrefaction are complex, involving many practical considerations. Wherever there is a collection of putrefying organic matter, whether on the ground, in the ground, within a faulty sewer, or under a habitation, there is a tireless foe to health and life. Not only are putrescent collections of garbage, decaying vegetables, manure, offal and human excreta harmful in themselves by reason of exhalations poisoning the air and leeching liquids polluting the earth; they are also depositories and multipliers of disease germs. Such collections may not

produce infectious diseases *de novo*, but they lessen the vitality of people living in the neighborhood, and thereby lessen the power of resisting epidemics. It is a well known pathological fact that nature struggles to eliminate disease by excretory processes. Accumulations of filth containing excreta may, therefore, harbor seeds of various communicable maladies. Sewer-gas, while it may not beget scarlatina, diphtheria, small-pox and other contagious diseases, easily becomes the vehicle of conveying them through obscure and intricate channels. Nor is this all. It is well known that a dung-heap will take cholera, hold it for an indefinite period, and convey it to human beings; that is, cholera dejecta thrown upon a dung-heap will plant in it the germs of the disease, there to take root and multiply, and may communicate themselves to man under favoring circumstances. A privy vault will take typhoid fever, have it badly for a long time, and communicate the disease to human beings. It is probable that a heap of putrescent garbage may catch diphtheria in the same way, multiply its germs and communicate them to unsuspecting children. There is little doubt that every seething mass of organic matter is affected with yellow fever in the midst of an epidemic of that disease. It is believed by many experienced physicians that yellow fever is not communicated from person to person, but is always caught from surrounding objects.

"So great is the influence of filth in these various ways that no epidemic can make any serious headway in the midst of cleanliness. One frequented privy vault, down with typhoid fever, is more dangerous than a house full of human patients. A big trunk full of dirty clothes, sick with yellow fever, is more to be shunned than a small hospital full of human victims of the disease. A village dung-hill, planted with cholera, is more perilous than a dozen cholera corpses. A foul sewer, swarming with scarlatina germs, may be more dangerous to a neighborhood than an infected school-house."

The management of *household offal* will be first treated. This may be considered under three classes, viz: 1. The fragments of food, scraps, kitchen grease, moist solids or liquids known as *swill*. 2. Ashes, dry house and yard sweepings. 3. Night soil. In every well-managed household the first two should be kept in separate receptacles for convenient and economical disposal. The receptacle for swill should be a covered half-barrel, a pork barrel or any other water tight vessel. The receptacle for ashes should be in a place sufficiently removed from the dwelling or out-houses to avoid the chances of fire from carelessness of servants. The swill should be removed twice a week at least, and in the case of hotels, boarding houses or large families it should be done daily. The dry garbage, all denoted under the general term *ashes*, should be removed weekly from dwellings, and also from stores and factories.

Before we come to the difficult question of the removal of garbage, we

will speak of the manner in which it should be cared for up to the time the garbage cart calls for it. No sweepings should be allowed to be thrown loosely into the streets, either from stores, houses or factories. Householders and proprietors should be required to keep their trash and ashes in boxes or barrels, as before mentioned. To allow violations of this simple rule, would be to abandon our streets at once, as they are now, to all sorts of litter. The indiscriminate deposit of dry trash now, in the streets, costs the corporation about one-third of the time of the street hands in sweeping it together into piles; and because of insufficient force to carry it off or from negligence, the same piles are scattered to be again swept together or oftentimes allowed to remain and rot. This state of things would be bad enough if the dry trash alone was thrown into the streets. It is not infrequently the case that some dead domestic animal, or the entrails of fish and fowls are seen in the middle of the streets, offending the eye and disgusting the nose. The plan proposed therefore for the prompt removal of garbage, we suggest as follows:

The city should be divided into six sections, representing the six work days of the week. This division should be accomplished with due reference to the density of the population in the different quarters of the city. Printed rules should be distributed giving the outlines of the sections, and notifying every householder, that on a certain day of the week, regularly, their ash barrels and swill tubs would be taken away free of charge, but on no other days. The carts should visit every section in pairs—the one taking the *ashes*, &c., the other taking the swill. The household receptacles should be emptied and left. A suitable penalty for neglect of the regulations ought to be ordained after sufficient notification.

There need be no particular model for a cart for ashes, but for *swill* there is a barrel constructed by the Eagle Odorless Apparatus Company, 12 Pemberton Square, Boston, four of which could be placed on a cart.

Serious and careful attention should be paid to the selection of a dumping ground. For years it has been noticed that the sweepings and even disgusting offal have been removed from the thickly settled portion of the city, and dumped in huge piles around the suburbs. Not unfrequently helpless families on the outskirts have been made sick by the pestilential emanations which have been carried by the prevailing winds into their humble homes.

It is plain that this is grossly wrong and extravagant. Wrong, because the helpless petty tax-payer having no influential voice to abate the nuisance for him, is taken sick, and either suffers in consequence of being insufficiently cared for, or falls to the charge of the city, *consuming medicines, the cost of which should have been spent in preventing his sickness by making the surroundings of his home healthful;* extravagant for

the reason above given, and also because the material which when wrongly disposed of engenders disease, if properly used upon a farm or garden would fertilize and improve it. But this is not the worst of it.

Garbage is used to fill in lots, and mend washed places in the streets. This suicidal action has been repeated again and again in our towns, until the lessons of hygiene and common sense have only taken possession of managers of some corporations, after pestilential disaster has brought it home.

The deposit of hundreds of loads of ashes, cabbage stalks, packing-straw, moulded vegetables, dead cats, and mingled kitchen refuse, does not strike one as being a wise sanitary proceeding for the present or for the future of streets or lots, but still all that portion of our city from about 10th street to 15th street, is largely upon a similar foundation, and notably in this part of our city, there has been, at certain seasons, a large amount of sickness, a part of which certainly had its origin in the emanations from these sources.

Now in the case of this city there is no reasonable excuse for the improper disposition of garbage. With a river front of two miles, we ought to be able to dispose of the daily accumulations which would not exceed thirty or forty cart loads, by means of scows, as is done in New Orleans. A dumping ground could easily be selected on the river at a safe distance from the city, one above and one below the city, in order to take advantage of the tides, at such points as directed by the Commissioners of Navigation.

If properly managed, arrangements might be made with farmers to take away *all the* garbage, including night soil, at a small cost. In some cities there is a competition between gardners to secure this garbage for their use at their own cost.

Swill is disposed of in Boston, and other cities, where a plan similar to the one we have outlined is adopted, to persons who use it to feed hogs, the city realizing thereby one-half of the total cost of collecting it.

We now come to a more difficult branch of our subject,—the disposal of night soil.

It is evident, to every citizen who observes, that our privy arrangements are abominable. A few years ago, through the courtesy of my friend, the late Dr. Wright, who was then City Physician, I got a statement as to the condition and location of our privies, which by the way is a correct procedure in the thorough estimation of the scope and character of the evil to be dealt with.

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Is there any remedy for this state of things? I answer yes! There could easily be an improved condition of the privies at a cost so small that any one owning a house, however poor, could afford to adopt it. But our case must be to remedy the evils as they are. The majority of privies have sinks. From time to time these sinks or vaults are emptied,

to the intense disgust of the neighborhood where it is done. In some cases it is accomplished by excavating the privy contents and depositing them in a pit on the premises. In other cases carts are loaded up and are driven through the streets, creating a horrid stench in their tracks. Now this can be remedied by adopting one of the many odorless plans. The Eagle Odorless Apparatus is the best excavating machine in use. A description of this apparatus can be had on application by letter at 12 Pemberton Square, Boston.

The necessary machinery costs about $600. It could be easily paid for by fees arising from the service of it. A committee could easily enquire into the practicability of it. I would suggest that it be purchased by the corporation and rented to reliable persons. The inducement would be to the person renting it that he could make it profitable by fees collected, and by the disposal of the night soil as a fertilizer. These are all practical questions, and as sanitarians we must look them square in the face. The air of this town reeks with the dense stinks from its hundreds of privies nightly, from August to October especially, and it could be made pure and sweet by the proper effort.

There are privies other than those spoken of, and for their remedy it would be necessary to send a cart with lime and copperas from door to door to disinfect them.

I have selected this subject for your consideration to-night, because it has given us all, at one time or other, much concern. It is not a pleasant thing to talk about, but its bearing upon the health of this community is material. We cannot assume the sanitary responsibility of our people without taking the lead in works of reform. I trust the city will take the matter in hand at an early day, so that a system may be thoroughly organized before the hot weather is fairly upon us.

The foregoing paper was presented to the New Hanover County Board of Health, and by resolution it was submitted to the Mayor and Board of Aldermen of the city of Wilmington for their consideration.

It must not be wrongly inferred that because the first effort to systematize the disposal of garbage began in Wilmington, that it is most needed there. There is hardly a community in the State to which the general principles here laid down do not apply. The smaller towns are sometimes the most neglected.

A sanitary survey of a town, if carefully and conscientiously conducted, would astonish those who have heretofore considered their town a clean one, and this applies to most of our towns and cities. It will be useless to expect any improvement in those communities not convinced of their uncleanliness. The authorities in towns and cities move very slowly in the direction of improvements, and when they do, it is to follow obsolete plans. It has been common in many places, indeed it is now common, when the very best has been done in the way of cleaning

streets and alleys, for the result to be only a make-ready-for-inspection attempt, with all the clean things in sight, and the harmful, dangerous things merely hid away and covered over with disinfectants. Disinfectants are made to displace the cleansing processes, and many people are lulled into a false security. Not only so, but being satisfied with a work well done, all efforts subside until the work can be no longer put off, and then is repeated the same perfunctory attempts at cleansing.

It is just this state of things that in New Orleans gave birth to that most useful body, known all over this great country for their faithful sanitary work, the New Orleans Auxiliary Sanitary Association. The example of New Orleans might be followed with profit in every city. The aid possible to be rendered to cities in the interests of cleanliness is very great by similar organizations. It is possible for auxiliary sanitary associations to work harmoniously with the regular health boards without any jarring, and the amount of emulation excited by the two bodies working earnestly to carry out the same thing, can be readily conceived.

If, therefore, the citizens of towns, villages and cities will show that they are awake to the necessities of a thorough sanitary police, by taking the initiative first on their own premises, and then in the streets nearest them, the needed reform cannot be long delayed.

It will interest many householders doubtless to know of all the plans for the disposal of garbage. One of the very best methods is to burn it. The following account is taken from the *Manufacturer and Builder:*

HOW TO DISPOSE OF KITCHEN GARBAGE.—The disposal of kitchen garbage is one of the standing annoyances to the cleanly house-keeper. In the country, or in the suburbs of our cities and towns, where the pig-pen is conveniently at hand, no trouble is experienced in ridding the premises of this form of refuse; but in the cities and towns the best regulated efforts for the removal are but indifferently successful, and in the summer season especially, when the attempt is made to save it, it speedily undergoes decomposition and becomes a putrid, offensive and unwholesome nuisance, an abomination to the nostrils, and a menace to the health of those who are forced to inhale its disgusting emanations. To avoid this constant and often intolerable nuisance, many intelligent house-keepers adopt the sensible course of burning it in the kitchen range as fast as it accumulates. Where this is done properly the method is effective and inoffensive, the gases and vapors evolved during the burning of the refuse being carried off with the other combustion products by the chimney, harmless and unperceived. There are some practical objections, however, to the plan of burning the refuse of the kitchen directly in contact with the fire, which are due chiefly to the fact that the stuff, composed largely of the parings and other rejected portions of vegetables, bones and other animal refuse, is largely charged with moisture. This water must first be driven off before the refuse will commence to burn, and this takes considerable time, or demands that the garbage shall be thrown in small quantities at time, which implies personal care and attention to the operation. The proper way to effect the burning of kitchen garbage, is manifestly first to thoroughly desicate it and to throw the dried material into the fire where it will be immediately consumed.

A very practical and excellent household apparatus for disposing of kitchen garbage upon this plan consists of a pail for the reception of the garbage, provided with a set of perforations, and with a dumping bottom which can be closed to hold the charge or opened to dump it when dried, by turning the crank on the side. This garbage pail is suspended within an outer cylinder having a circular opening in its base, so that it may fit over one of the openings of the range, and a close cover whose edge dips into a water-seal. To use this apparatus, it is placed over one of the openings of the range. The dumping bottom of the pail is closed by raising the crank and putting the ring over the handle, the garbage is emptied into the pail, the water-seal filled, and the cover put on. After half an hour or so, more or less, according to the nature and quantity of the garbage and the heat of the range, the contents of the pail will be found to be thoroughly dried, and may be dumped into the fire and burned by releasing the crank handle from the ring. During the drying of the charge all the disengaged vapors are either condensed in the water-seal, or dissipated with the vapor from the evaporating pan. By the peculiar construction of the apparatus, the contents of the pail are hermetically sealed within it, and none of the vapors find their way out of it; consequently no unpleasant odors are given off during the operation. The desicated garbage is immediately burned as it is dumped into the fire, and the whole operation is effected simply, expeditiously and with no disagreeable accompaniments.

The method and apparatus here described is worthy of the highest recommendation, not only because of its convenience and cleanliness, but also on the much more important ground of sanitary considerations. No intelligent housekeeper requires to be told that the foul emanations from the putrefying garbage receptacles, which no amount of cleansing will suffice to keep clean, are in addition to their extreme offensiveness, also in the highest degree unwholesome, in that they can become the carrier of the germs of pestilential fevers, which are most insidious in their approach and very frequently fatal in their results. To unwholesome influences of this kind the children of the household, by reason of their superior sensitiveness, and women, for the reason of their domestic habits, keep them constantly exposed to their effects, are especially susceptible. We highly approve of the method and apparatus here described for disposing of kitchen garbage, as affording a simple, efficient and expeditious means of doing away with an offensive and unwholesome domestic nuisance.

The apparatus is manufactured and for sale at Myers' Sanitary Depot, 94 Beekman street, New York.

Directions for Use.—Set the burners on the range, close damper by raising crank and putting ring over handle, put garbage in pail, fill the water-seal and put on the lid. After half an hour or so, according to the nature of the garbage and the amount of heat, the contents will be dried and may be dumped into the fire and burned by releasing the crank handle from the ring. Meanwhile all vapors have been condensed in the water-seal and dissipated with the water in the evaporating pan, no odor escaping.

On a larger scale the garbage of the city of New York is to be disposed of by burning in a Storer's Garbage Cremating Furnace. We get our information from the *Scientific American* of July 2d, 1881. About 750,000 tons of garbage were collected there the last year. This mass now burned to ashes in the furnace will yield a large amount of ashes, suitable for filling streets and lots.

The "furnace consists of a brick-lined cylinder, 60 feet long or thereabouts, and six feet in diameter, set at an inclination of about half an

inch to the foot, on anti-friction rollers, and revolved by worm and wheel. At the feed end of the cylinder is a small fire-place that is used only for the ignition of the pulverized fuel, which is the principal agent in this work, and for which the inventor of this furnace holds the only United States patents. At the delivery end of the cylinder is shown a receiving chamber or pit (the parts being broken away for this purpose), into which the dried material falls, and whence it is continuously removed by a bucket elevator.

Just beyond this pit, in the base of the smoke stack, is the gas mingling and combustion chamber, in which the escaping steam and gases are decomposed and thereby rendered inoffensive.

The operation of the furnace is as follows: The fire is urged in the first fire place until the latter is hot enough to instantly ignite the pulverized coal which is injected through it by the pulverizer or fan. The jet of burning pulverized coal entering the cylinder quickly heats it throughout to a white heat. At the same time the fire on the grate in the gas combustion chamber has brought the walls and perforated dome thereof to a white heat.

The cylinder is then put in motion at the rate of from two to ten revolutions per minute, and the garbage and ashes, separately or together, are dumped into it from the carts.

The material, as it passes through the cylinder, is exposed to the direct contact of the intense flame and to the direct radiation from the hot brick lining of the cylinder for as long a period as may be desired, this depending upon the speed of the cylinder.

At a speed of about five revolutions a minute the furnace will dry the garbage to the best condition for a fertilizer, while at a speed of two revolutions a minute for the furnace the garbage will be reduced to ashes. The speed is regulated at will by the use of cone pulleys on the counter-shafts.

The enormous volume of steam and gases generated in the process move forward into the gas combustion chamber, and are there decomposed and burned, the perforated dome retaining them sufficiently long for this purpose.

There escapes then through the dome an intense white flame of sufficient volume to generate steam for all the purposes of the work; not the slightest offensive odor escaping.

A drip pipe discharges a constant spray of water on the cylinder to prevent the expansion thereof, so that the brick lining shall not become loose.

The smokestack is constructed of brick above the gas consuming chamber; this construction is preferable for furnaces erected on land; but for those on barges an iron stack is better.

One cylinder, 60 feet long and 6 feet in diameter, will reduce to ashes

each day the daily production of garbage in New York, or over 250 loads per diem, and the cost of it, complete with all its auxiliary parts and the engine to run it, will not exceed $12,000.

THE VALUE OF NIGHT-SOIL.

From a German work, on "The Employment of Human Excreta and Animal Remains in Agriculture," by Wilhelm Hahn, we extract the following statement of the value to the farmer of a manure that is now almost entirely wasted in every part of our country. According to these tables, the human excrement of our population of 40,000,000 is equal, in respect to its nitrogen, to *one hundred millions tons of cattle-dung*. This is a statement that needs no comment. We recommend it to the careful consideration of all who care for the problems of national prosperity.

Inquiry has shown that a grown person produces daily 2 lbs. of fæces, of which 1⅕ lbs. is fluid and ⅕ lb. solid.

In every 100 lbs of urine there are 4 5-6 lbs. nitrogenous matter, in the proportion of 100; 46¾; so that in 100 lbs. of urine we have about 2¼ lbs. nitrogen.

In 100 lbs. of solid fæces we have 4 1-10 lbs. nitrogen, so that in the yearly product of a grown person (547 lbs. fluid and 183 lbs. solid fæces) we have:

In the fluid.....12½ lbs. nitrogen.
" solid..... 7½ " "

Or.....19 5-6 lbs. nitrogen per annum.

Or in 100 lbs. of the mixed fæces we have 2¾ lbs. nitrogen.

So that, in respect to nitrogen, 100 lbs. mixed human fæces are equal to:

417¾ lbs. horse-dung. 753⅓ lbs. cattle-dung.
445 1-5 lbs. pig-dung. 298½lbs. sheep-dung.

As compared with the best guano, which contains 13 per cent. of nitrogen, the yearly product of a grown person would equal 1½ cwt. of the latter, as regards nitrogen, or 100 lbs. of mixed fæces would equal 34½ lbs. of best guano.

In respect to alkalies, 100 lbs. human fæces equal:

109 lbs. horse-dung. 111 lbs. cow-dung.
112 lbs. pig-dung. 51 lbs. sheep-dung.

In respect to phosphates, 100 lbs. human fæces equal:

208 lbs. horse-dung. 415 lbs. cow-dung.
208 lbs. pig-dung. 124 lbs. sheep-dung.

In comparing human fæces with that of animals, it would be well to take into consideration the fact that quantities of straw, &c., are mixed therewith. A comparison of human fæces with stable-manure will show that 100 lbs. of the former are equal in respect to nitrogen to:

550 lbs. horse-stable manure. 753 lbs. cow-stable manure.
560 lbs. pig " 400 lbs. sheep "

In respect to alkalies, to:

135 lbs. horse-stable manure. 140 lbs. cow-stable manure.
142 lbs. pig " 75 lbs. sheep "

Or, in respect to phosphoric acid, to:

320 lbs. horse-stable manure. 500 lbs. cow-stable manure.
330 lbs. pig " 250 lbs. sheep "

As the best guano contains about 12 per cent. alkali salts, and an equal quantity of phosphoric acid, 100 lbs. mixed fæces will equal 8 lbs. guano in respect to alkalies, and 5⅔ lbs. in respect to phosphoric acid.

"If," says Professor Liebig, "we admit that the liquid and solid excrements of man amount on an average to 1½ lb. daily (5-4 lb. of urine and ¼ lb. fæces). and that both together contain 3 per cent. of nitrogen, then in one year they will amount to 547 lbs., which contains 16 41-100 lbs. of nitrogen,—a quantity sufficient to yield the nitrogen of 800 lbs. of wheat, rye, oats, or of 900 lbs. of barley." (*Boussingault's Analysis.*) "This much more than is necessary to add to an acre of land in order to obtain, with the assistance of the nitrogen absorbed from the atmosphere, the richest possible crop every year. Every town and farm might thus supply itself with the manure, which, besides containing the most nitrogen, contains also the most phosphates; and, if rotation of the crops were adopted, they would be most abundant."

"Night-soil," says Gregory, the successful seedsman and farmer of Marblehead, Mass., "used in compost with muck or soil, stable-manure, sea-manure, &c., is good for *all* crops."

Joseph Harris, in his valuable "Talks on Manures," says, "The composition of human excrements, as compared with the mean composition of the excrements from horses, cows, sheep, and swine, so far as the nitrogen, phosphoric acid, and potash are concerned, is as follows:

Table showing the Amount of Nitrogen, Phosphoric Acid, and Potash in One Ton of Fresh Human Excrements, and in One Ton of Fresh Excrements from Horses, Cows, Sheep, and Swine.

One Ton, (2,000 lbs.)	Solids.			Urine.		
	Nitrogen.	Phosphoric Acid.	Potash	Nitrogen.	Phosphoric Acid.	Potash
Human.....	20.0 lbs.	21.8 lbs.	5.0 lbs.	12.0 lbs.	3.7 lbs.	4.0 lbs.
Mean of Horse, Cow, Sheep, and Swine.....	9.4 lbs.	6.2 lbs.	4.3 lbs.	22.5 lbs.	0.4 lbs.	25.4 lbs.

"One ton of fresh fæces contains more than twice as much nitrogen, and more than three times as much phosphoric acid, as a ton of fresh-mixed animal dung. The nitrogen, too, is probably in a more available condition than that in common barnyard-dung; and we should not be far wrong in estimating 1 ton of fæces equal to 2½ tons of ordinary dung, or about equal in value to carefully preserved manure from liberally-fed sheep, swine, and fattening cattle. . . . It has been ascertained by Lawes and Gilbert that the amount of matter voided by an adult male in the course of a year is: fæces, 95 lbs.; urine, 1,049; totally liquid and solid excrements in the pure state, 1,144 lbs. These contain:

"Dry substance.—Fæces, 23.75 lbs.; urine, 34.50 lbs.; total, 58.25 lbs.

"Mineral matter.—Fæces, 2.50 lbs.; urine, 12 lbs.; total, 14.50 lbs.

"Carbon.—Fæces, 10 lbs.; urine, 12 lbs.; total, 22 lbs.

"Nitrogen—Fæces, 1.2 lbs.; urine, 10.8 lbs.; total, 12 lbs.

"Phosphoric acid.—Fæces, 0.7 lbs.; urine, 1.93 lbs.; total, 2.63 lbs.

"Potash—Fæces, 0.24 lbs.; urine, 2.01 lbs.; total, 2.25 lbs.

"The amount of potash is given by Professor E. Wolff, not by Lawes and Gilbert.

"The mixed solid and liquid excrements, in the condition they leave the body, contain about 95 per cent. of water. It would require, therefore, 20 tons of

fresh-mixed excrements to make a ton of *dry* night-soil, or the entire amount voided by a mixed family of forty-three persons in a year.

"100 lbs. of fresh fæces contain 75 lbs. of water and 25 lbs. of dry substance.

"100 lbs. of fresh urine contain in 96.50 lbs. of water and 3.50 lbs. of dry substance.

"100 lbs. of dry substance of the fæces contain 5 lbs. of nitrogen and 5.50 lbs. of phosphates.

"100 lbs. of the dry substance of the urine contain 27 lbs. of nitrogen and 10.75 lbs. of phosphates.

"These figures are from Lawes and Gilbert, and may be taken as representing the composition of excrements from moderately well fed persons.

"According to Wolff, a ton of fresh human urine contains 12 lbs. of nitrogen; according to Lawes and Gilbert, 18 lbs.

"The value of a ton of fresh fæces on the land is $1.09."—*Pamphlet of Ames Eagle Odorless Company.*

WATER SUPPLY FOR TOWNS AND CITIES.

The first work in elementary hygienics, and the most important work that can occupy the attention of sanitary managers anywhere, is the supply of water. This work was inaugurated by the Board of Health early after its organization, and since then has been of the foremost importance.

Among the facilities granted to us by our niggardly law was to permit the analyses of drinking water for the information of the people. The Board used all its means for some time to increase the facilities thus offered, and the result was an extensive enquiry as to the condition of drinking water on the part of citizens. From many parts of the State analyses have been published.

In our first Biennial Report these analyses were published in detail, and they continue to attract the interest of the people everywhere. Especially was the work done thoroughly in Wilmington. Professor Kerr had made analyses, previous to the organization of the Board, of water from the various streams about the city, and of the Cape Fear River at several points. At irregular intervals after that the water of these streams was made a matter of study, and the results published in the daily papers for the information of the people. So thorough was the conviction that the water of most wells was unfit for domestic use, that in 1881 a company was

organized to supply the city with water fit for domestic purposes.

Work was commenced in 1881, the pipes being laid in all the principal streets, until the approach of warm weather, according to municipal ordinances, put an end to the ditching.

At this point in the history of the company it was not announced to the public what source of supply would be selected. The question was discussed by the New Hanover County Board of Health, at the suggestion of the Mayor (who was President of the Board of Health), as soon as it was made known what would probably be the source of the supply. It was on April 27, 1881, many months preceding the tender of the water by the company to the city, that the New Hanover County Board of Health declared that the water of the northeast branch of the Cape Fear River, near Wilmington, was not fit for domestic purposes.

The determination of the source of water was finally submitted to the New Hanover County Board of Health on January 19, 1882, and two meetings were held for the special purposes of discussing the merits of the water of the northeast branch.

The analyses submitted were made by three different chemists, viz: Professor W. R. Nichols, of Boston, Drs. Ledoux and Dabney, of the Agricultural Experiment Station.

Professor Nichols' analyses were favorable, but were qualified with the assertion that in order to pronounce upon the fitness of water for domestic purposes, the surroundings as to present and prospective contamination must be ascertained. In the words of Professor Nichols: "Permit me to say that as far as I express an opinion, it is with some reservation, for while the chemical examination *assists* in indicating the character of a water, it only *assists*. The questions of the surroundings and of liability to pollution

are of even greater importance, and on these points I am not informed."

EXAMINATION OF VARIOUS SURFACE WATERS.

No.	Date.	Locality.	Results expressed in parts in 100,000. Unfiltered Water. Ammonia	Unfiltered Water. Albuminoid Ammonia.	Solid Red'e Inorganic.	Solid Red'e Organic and Volatile.	Total at 212F.	Chlorine.
A	Dec. 1880.	Wilmington.....	0.004	0.013	4.84	2.34	7.18	0.53
B	Dec. 1880.	Wilmington.....	0.008	0.013	3.56	1.62	5.18	0.60
July.	Dec. 1876.	Springfield, Mass Average of 45 Samples.	0.017	0.052	2.09	2.86	4.95	
	June 1877	Plymouth, Mass.	0.008	0.017	1.60	1.40	3.00	
	July 1876 to June 1877	Boston, Mass.....						
		Largest.....	0.006	0.018			5.58	
		Smallest.....	0.001	0.010			3.72	
	July 1880	Lynn, Mass.....	0.006	0 016	2.88	0.80	3.68	0.49

The following is Prof. Nichols' Analyses of two specimens, sent at two different times. They were from the N. E. Cape Fear and a Mill Pond:

In Solution.	Results Expressed. As so many parts by weight in 100,000 parts weight of the water. "A."	"B."	As so many grains to the United States gallon of 231 cubic inches. "A."	"B."
Ammonia.....	0.004	0.008	0.002	0.005
Albuminoid Ammonia.....	0.013	0.013	0.008	0.008
Chlorine	0.53	0.60	0.31	0.35
Inorganic Matter.....	4.84	3.56	2.82	2.08
Organic and Volatile Matter	2.34	1.62	1.36	0.94
Total dissolved solids.....	7.18	5.18	4.18	3.02
In Suspension.				
Inorganic Matter.....	.....	0.054	.....	0.031
Organic and Volatile Matter	.....	0.071	.....	0.041
Total Substances.....	.....	0.125	.....	0.072
Total Suspension.....	.....	.....	.....	.....

Each gave a faint test for nitrates when the sulphate of iron test was applied to the unconcentrated water.

The analyses performed by Dr. Dabney of specimens taken at the same time, did not vary from those made by Prof. Nichols in any material points. Subsequently during the long continued drought of 1881, analyses were made by Dr. Dabney with the following results:

THE N. C. AGRICULTURAL EXPERIMENT STATION,
Raleigh, N. C., September 27, 1881.

Analysis No. 1367.

SIR: The sample of water sent to the Station for analysis, and marked "From N. E. Cape Fear, drawn two days before termination of long drought," contains:

Total solids in solution	27.40 grs. per gallon.
Chlorine	10.25 " " "
Free Ammonia	0.04 parts per million.
Albuminoid Ammonia	0.23 " " "

NOTE.—Water of a greenish black color, with some matter in suspension. A strong odor of sulphuretted hydrogen. Chlorine and Albuminoid Ammonia too high.

Your obedient servant,

CHAS. W. DABNEY, JR,
Director.

To DR. THOS. F. WOOD,
Secretary State Board of Health, Wilmington, N. C.

THE N. C. AGRICULTURAL EXPERIMENT STATION,
Raleigh, N. C., November 25, 1881.

Analysis No. 1411.

SIR: The sample of water sent to the Station for analysis, and marked "From N. E. River, wharf of Water Works, near Hilton Bridge," October 29th, 1881, contains:

Total solids in solution	145.30 grs. per gallon.
Chlorine	64.82 " " "
Free Ammonia	0.26 parts per million.
Albuminoid Ammonia	.25 " " "

NOTE.—Yellowish color, some suspended matter, slight odor of sulphuretted Hydrogen. Chlorine and Albuminoid Ammonia too high.

Your obedient servant,

CHAS. W. DABNEY, JR.,
Director.

To DR. THOS. F. WOOD,
Secretary State Board of Health, Wilmington, N. C.

No analyses were presented from Professor Nichols at a date subsequent to the one given above. Therefore the Board had for its guidance only this meagre chemical record.

The *history of the water* was first discussed. 1. As to the present and prospective sewage contamination. 2. As to the occasional influx of salt water. 3. The experience of ship-masters and mill owners and others using the water, as to the effect on the health of employés.

The *chemical analysis* of the water was next considered. 1. As to sewage contamination. 2. Pollution by the cemeteries located on the banks of its tributary, Smith's Creek. 3. Pollution by the slaughter-houses located on or near Smith's Creek.

A careful consideration elicited the history of the bad effects of drinking water upon mill hands and others at one period of its history. The sewage now being emptied into the stream along the river front, and the prospect of the large increase of water-closets after water is supplied, and the consequent great increase of sewage. All this from the west side of the city. On the east side of the city, the natural drainage being into a canal emptying into Burnt Mill Creek and Smith's Creek, and finally the northeast branch of the Cape Fear. The brackish condition of the water many seasons, as evidenced by the presence of crabs as high up the river as the Navassa Guano Works.

The chemical analyses were not considered by the Board as sufficiently numerous to found an opinion upon that exclusively. While the presence of nitrogenous matter was not very great, it was higher than the received standard, and that the amount of solid constituents was by far too great. After a careful consultation the following resolution was passed:

"*Resolved*, That in the opinion of this Board the water from the North East branch of the Cape Fear River, as at present tendered to the city by the Clarendon Water-Works Company, is not suited or fit for domestic use, according to the evidence presented."

The action of the New Hanover Board of Health was reported to the Board of Aldermen, in connection with other matter, and the water was formally received, entirely ignoring the opinion of the Board of Health as to the merits of the water for domestic purposes.

Unfortunately, the efforts of sanitarians to protect the public, frequently meet with such rebuffs. The financial interests involved so frequently outweighs every other consideration, that it is discouraging to attempt such responsible business as advising public officers in matters appertaining to the public health. It is too often the case that they seek for advice hoping that it will coincide with the schemes they have on hand, they deeming it entirely proper to accept or reject it, as it suits their convenience.

In the case of the introduction of water into the city of Wilmington, we have an example of what is liable to happen in every town in the State. The Board of Health assiduously studied the sources of water, publishing the results from time to time. As soon as the conviction was brought home to the community that a public supply of better water was necessary, then the matter was no longer allowed to remain a sanitary, but a financial one. This has been rather too hastily sketched to bring out all the points of interest, but enough has been said to warn corporations of the unwisdom of contracting for water-works without first having it explicitly stated the source from whence they are to draw their water supply.

No better opportunity could occur in the history of a State than in our own, to forecast the needs of towns in respect to the water supply, and to establish fundamental laws for the erection of water-works. Now is our opportunity to establish sanitary principles for the guidance in advance of the establishment of water supply in our towns, and save to the State complex legislation in the future. This very question which is now no one's business but that of the capitalists, has caused other States a vast deal of

anxiety. The pollution of streams in densely settled States, requires the greatest vigilance and carefully framed statutes for its regulation; and even then, as is evidenced by the unsatisfactory condition of the water supply in Massachusetts, we are informed that within ten years the Legislature of that State passed one hundred and fifty-two acts and resolves in regard to water supplies for cities and towns.

The Board of Health has been in time with their advice to save other communities in the State from blunders, and having done their duty they hope that intelligent council will prevail in the future.

COUNTY CANVASSERS FOR THE PURPOSE OF SECURING THE ATTENTION OF THE LEGISLATORS TO THE WORK OF THE BOARD OF HEALTH.

At the conjoint session of the Board of Health at Asheville in 1881, the Secretary of the Board was directed to consult with the President of the Medical Society of North Carolina, and make up a list of canvassers, one for each county. The Secretary of the Board being for that year also President of the Medical Society, the list was made. Agreeably to direction, he selected such persons as were members of the Society, but in counties where there was no resident member, the most active medical men, according to the best information available, were selected.

The following is the list. It is very incomplete, and many erasures and additions will be necessary before it will fulfil the design:

NAMES OF GENTLEMEN APPOINTED TO CANVASS THE WORK OF THE BOARD OF HEALTH WITH A VIEW TO FUTURE LEGISLATION.

Alamance,	Dr. George W. Long.
Alexander,	
Alleghany,	Dr. John L. Smith.
Anson,	" Simpson Jones.
Ashe,	" James Wagg.
Beaufort,	" John McDonald.

Bertie,.....
Bladen,.....Dr. James S. Robinson.
Brunswick,..... " W. G. Curtis.
Buncombe,..... " W. L Hilliard.
Burke,.....
Cabarrus,.....Dr. W. H. Lilly.
Caldwell,.....
Camden,.....Dr. J. H. Pool.
Carteret,..... " Manney.
Caswell,.....
Catawba,.....Dr. George H. West.
Chatham,..... " L. A. Hanks.
Cherokee,..... " Patton.
Chowan,..... " R. H. Winborne.
Clay,..... " Killyan.
Cleveland,..... " J. C. Gidney.
Columbus,..... " M. R. Morrison.
Craven,..... " Frank Duffy.
Cumberland,..... " T. D. Haigh.
Currituck,.....
Dare,.....
Davidson,.....Dr. R. L. Payne.
Davie,.....
Duplin,.....Dr. Henry W. Faison.
Edgecombe,..... " L. L. Staton.
Forsyth,..... " H. T. Bahnson.
Franklin,..... " E. S. Foster.
Gaston,..... " E. B. Holland.
Gates,.....
Graham,.....
Granville,.....Dr. W. R. Wilson.
Greene,..... " W. C. Galloway.
Guilford,..... " W. P. Beall.
Halifax,..... " Isaac E. Greene.
Harnett,.....
Haywood,.....Dr. G. D. S. Allen.
Henderson,..... " J. L. Edgerton.
Hertford,..... " R. P. Thomas.
Hyde,.....
Iredell,.....Dr. Thomas E. Anderson.
Jackson,..... " J. M. Chandler.
Johnston,..... " R. J. Noble.
Jones,.....
Lenoir,.....Dr. Henry Tull.

Lincoln, ... Dr. J. M. Lawing.
Macon, ... " S. H. Lyle.
Madison, ... " W. L. Reagan.
Martin, ... " T. S. Burbank.
McDowell, ...
Mecklenburg, ... Dr. J. Graham.
Mitchell, ...
Montgomery, ... Dr. W. A. Simmons.
Moore, ... " A. V. Budd.
Nash, ... " David N. Sills.
New Hanover, ... " J. C. Walker.
Northampton, ... " V. S. McNider.
Onslow, ... " J. L. Nicholson.
Orange, ... " T. B. Harriss.
Pamlico, ...
Pasquotank, ... Dr. Wood.
Pender, ... " W. T. Ennett.
Perquimans, ...
Person, ... Dr. R. S. Bayn s.
Pitt, ... " C. J. O'Hagan.
Polk, ...
Randolph, ... Dr. C. W. Woollen.
Richmond, ... " J. M. Covington.
Robeson, ... " R. F. Lewis.
Rockingham, ...
Rowan, ... Dr. J. J. Summerell.
Rutherford, ...
Sampson, ... Dr. A. Holmes.
Stanly, ... " T. F. Meisenheimer.
Stokes, ... " M. D. Phillips.
Surry, ...
Transylvania, ... Dr. C. W. Hunt.
Tyrrell, ...
Union, ... Dr. Isaac H. Blair.
Wake, ... " R. H. Lewis.
Warren, ... " George A Foote.
Washington, ... " L M. Powers.
Watauga, ... " W. B. Council.
Wayne, ... " J. D. Roberts.
Wilkes, ...
Wilson, ... Dr. John K. Ruffin.
Yadkin, ... " L. G. Hunt.
Yancey, ...

A circular will be published by the Board in November or December, and these will be distributed to every county. The Secretary would esteem it a favor to get the name of one active physician for every county to coöperate in the proposed canvass.

Respectfully submitted,

THOMAS F. WOOD, M. D.,

Secretary N. C. Board of Health.

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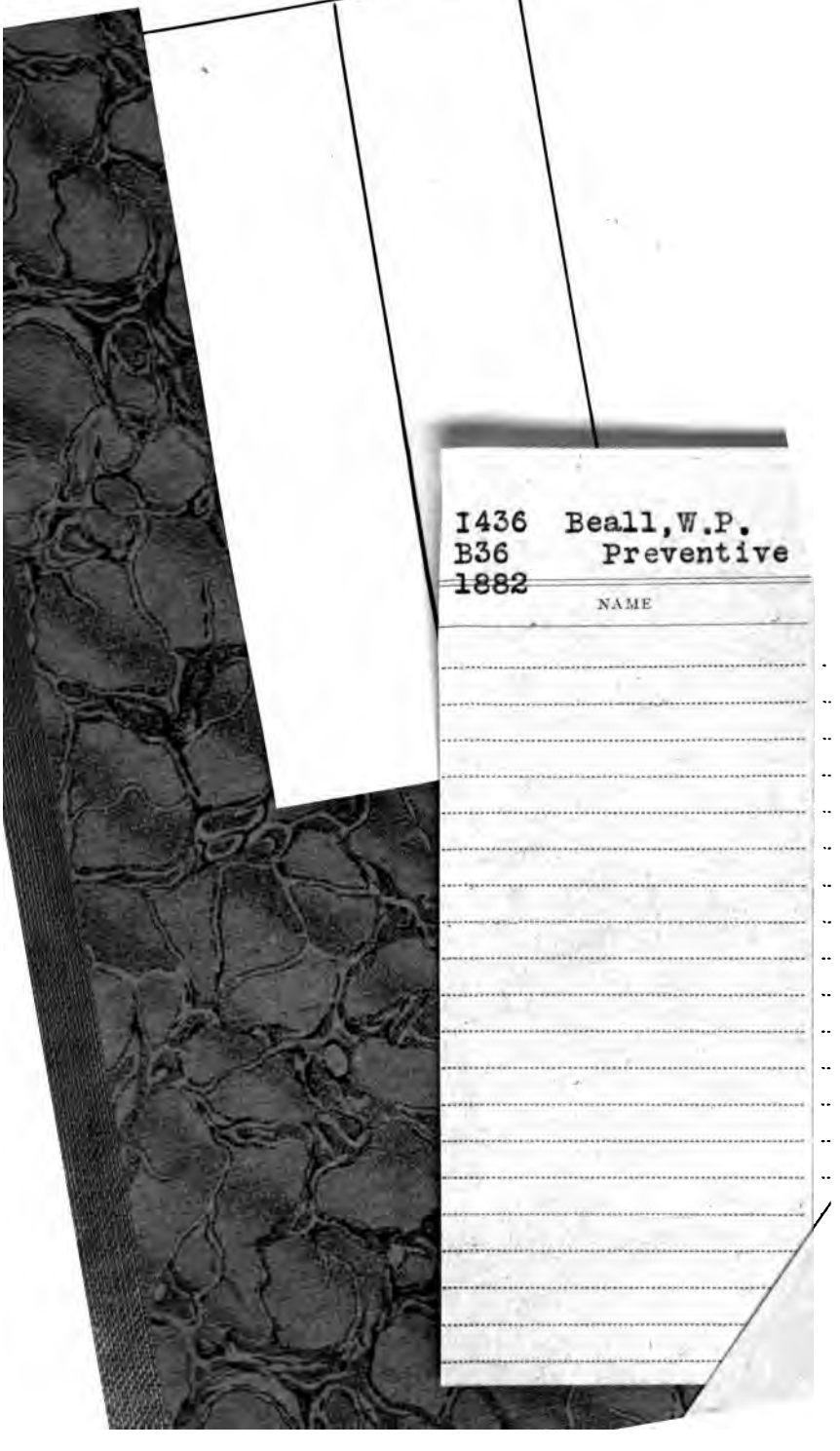

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